



# **Town Council Special Meeting**

**July 19, 2022 | 3:00 PM**

**Town Hall | 73 Hunter Street, Apex, NC**

## Town Council and Administration

Mayor: Jacques K. Gilbert | Mayor Pro Tem: Audra Killingworth  
Council Members: Brett D. Gantt; Cheryl F. Stallings; Terry Mahaffey; Edward Gray  
Town Manager: Catherine Crosby | Assistant Town Managers: Shawn Purvis and Marty Stone  
Town Clerk: Allen Coleman, CMC, NCCCC | Town Attorney: Laurie L. Hohe

- 1. Call to Order | Pledge of Allegiance**
  
- 2. Additional Elevated Water Tank**
  - a. Discussion and Possible Motion**
  
- 3. Town's Big Branch Pump Station and Force Main Design Project**
  - a. Discussion and Possible Motion**
  
- 4. Closed Session**

*North Carolina General Statutes § 143-318.11*  
*(6) To consider the qualifications, competence, performance, character, fitness, conditions of appointment, or conditions of initial employment of an individual public officer or employee or prospective public officer or employee; or to hear or investigate a complaint, charge, or grievance by or against an individual public officer or employee.*
  
- 5. Adjournment**

# | Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: WORK SESSION

Meeting Date: July 19, 2022

## Item Details

Presenter(s): Michael Deaton, Water Resources Director

Department(s): Water Resources

### Requested Action

- A. Discussion on possible locations and aesthetics for an additional elevated water tank
- B. Possible motion to approve the tank location and tank style.

### Approval Recommended?

Yes

### Item Details

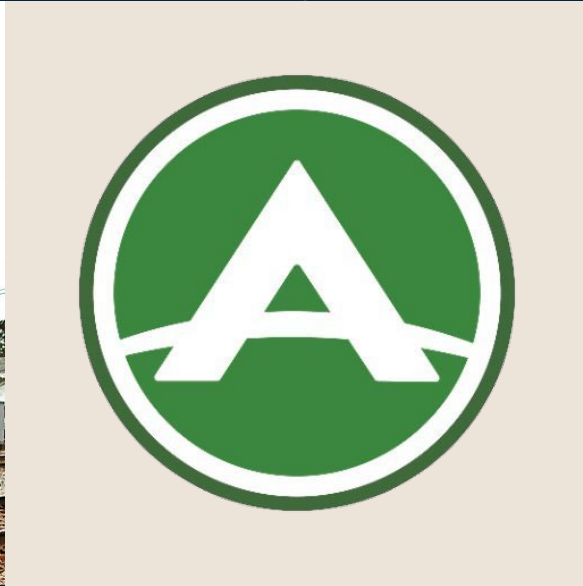
Details of the Technical Memorandum which evaluates multiple potential tank sites along with different tank design styles will be discussed during the workshop.

### Attachments

- Powerpoint Presentation
- Technical Memorandum
- Summary Table







# Town of Apex

Elevated Water Tank Evaluation

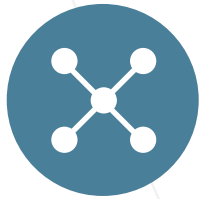
**Wooten**



## Purpose & Criteria



The Town of Apex has determined that a new elevated water storage tank is needed to supplement the water distribution system.



The Town staff has completed a water model of the existing water distribution system and has set design criteria for the proposed water tank :

- **1.5 MG Capacity**
- **616.8 ft msl. Water Elevation**



# Site Selection

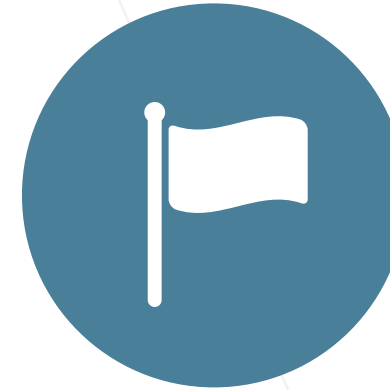
Seven Sites were identified as potential elevated water tank locations based on:



*Proximity to Support Areas of Growth*



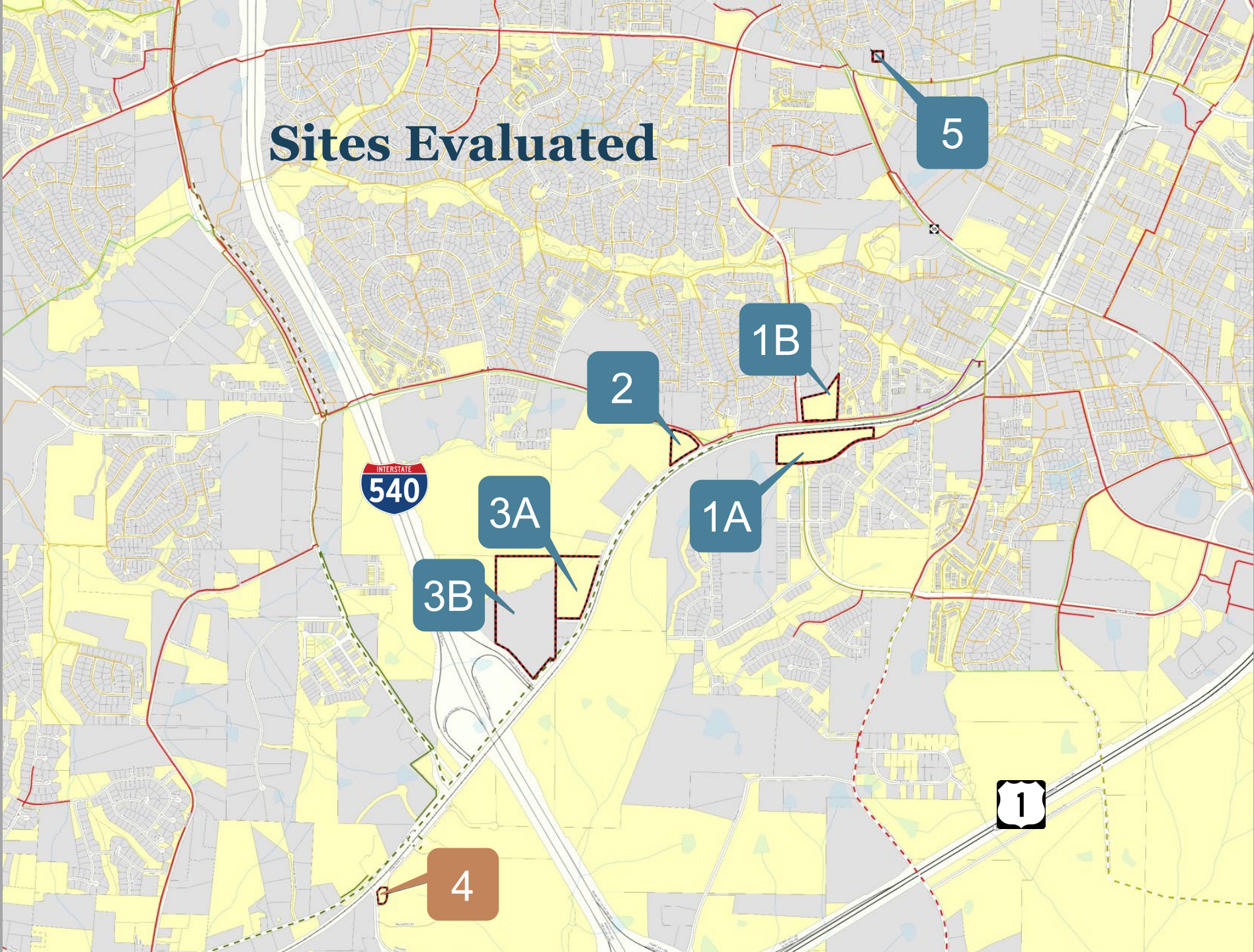
*Areas Identified for System Optimization in Water Model*



*Town Property Ownership Status or the Ability to Purchase*



# Sites Evaluated





# Site Evaluation Criteria



## Water Availability

Proximity to existing water distribution network



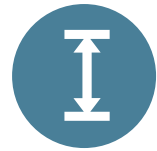
## Stormwater Infrastructure

Proximity to existing stormwater collection network



## FAA/FCC Requirements

Based on Requirements of the Federal Aviation Administration (FAA) and Federal Communications Commission (FCC)



## Tank Height

Based on new tank overflow elevation of 616.8 ft msl. and the site ground elevation



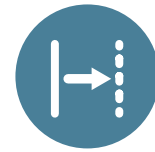
## Site Work Required

Consideration given to existing site condition and near-future plans for Town development



## Screening

Based on the Town's Unified Development Ordinance



## Setbacks/Height Restrictions

Based on the Town's Unified Development Ordinance



## Purchase Price/Availability

Highest Score: Property owned by the Town  
Middle Score: Property the Town has a future goal to purchase  
Lowest Score: Property the Town had no prior interest in purchasing



## Adjacent Property Concerns

Based on nearby population density: Parcels within a quarter mile radius of the tank



# Site Scoring



Criteria	Weight	Potential Sites for Locating New Elevated Water Storage Tank													
		No. 1A		No. 1B		No. 2		No. 3A		No. 3B		No. 4		No. 5	
Water Availability	10	4	40	5	50	4	40	2	20	2	20	5	50	5	50
Storm Water Infrastructure Availability	5	3	15	3	15	3	15	3	15	3	15	3	15	3	15
FAA/FCC Requirements	5	5	25	5	25	5	25	3	15	3	15	3	15	5	25
Tank Height	15	4	60	4	60	4	60	1	15	1	15	1	10	4	60
Site Work	10	5	50	5	50	1	10	1	10	1	10	3	30	5	50
Screening	5	1	5	1	5	3	15	5	25	5	25	5	25	1	5
Setbacks/Height Restrictions	5	3	15	3	15	3	15	3	15	3	15	3	15	3	15
Purchase Price/Availability	15	3	45	3	45	3	45	3	45	3	45	5	125	5	75
Adjacent Property Concerns	25	1	25	1	25	3	75	5	125	5	125	3	75	1	25
<b>Total Score*</b>		<b>280</b>		<b>290</b>		<b>300</b>		<b>285</b>		<b>285</b>		<b>360</b>		<b>320</b>	

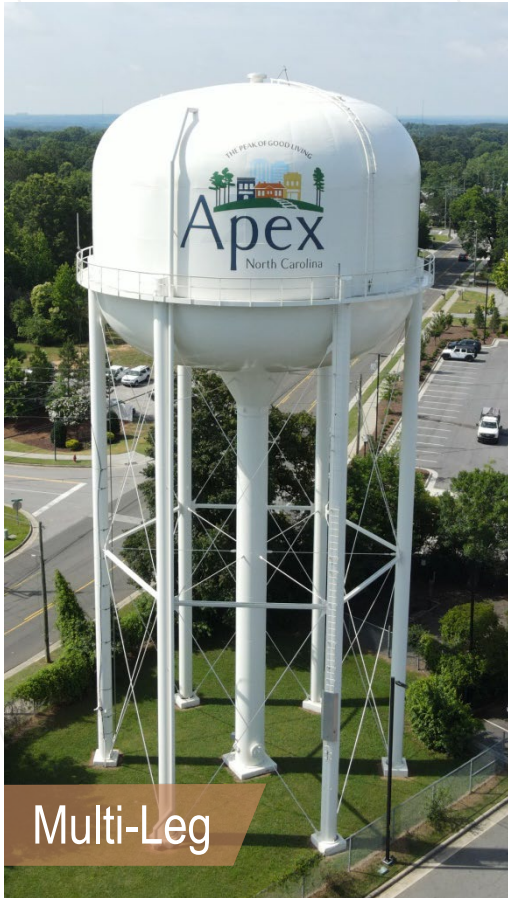
Alternative Parameters are rated 1-5 (5 being most favorable)

\*Maximum Total Score of 500 points

# Recommended Site



# Tank Style Selection



Multi-Leg



Composite



Hydropillar



Spheroid



# Tank Evaluation Criteria



## Capital Cost

Based on tank type as provided by suppliers



## Maintenance Cost

Estimated by Town's existing O&M contractor, Suez Water Technologies



## Aesthetics

Based on subjective impression and previous experience



## Interior Space

Based on usable space within the tank column interior



## Communication Corral Options

Based on usable space on the tank bowl/top for placement of communication equipment



## Life Cycle Cost

Based on capital and maintenance cost over a 20-year period

# Tank Scoring



Parameters	Weight	Types of Elevated Water Storage Tanks							
		Multi-Leg		Composite		Hydropillar		Spheroid	
Capital Cost	25	4	100	5	125	2	50	2	50
Maintenance	20	1	20	4	80	3	60	5	100
Aesthetics	10	1	10	3	30	4	40	5	50
Interior Space	15	0	0	5	75	5	75	3	45
Communication Corral Options	5	3	15	4	20	3	15	3	15
Life Cycle Cost	25	3	75	5	125	3	75	4	100
<b>Total Score*</b>		220		455		315		360	

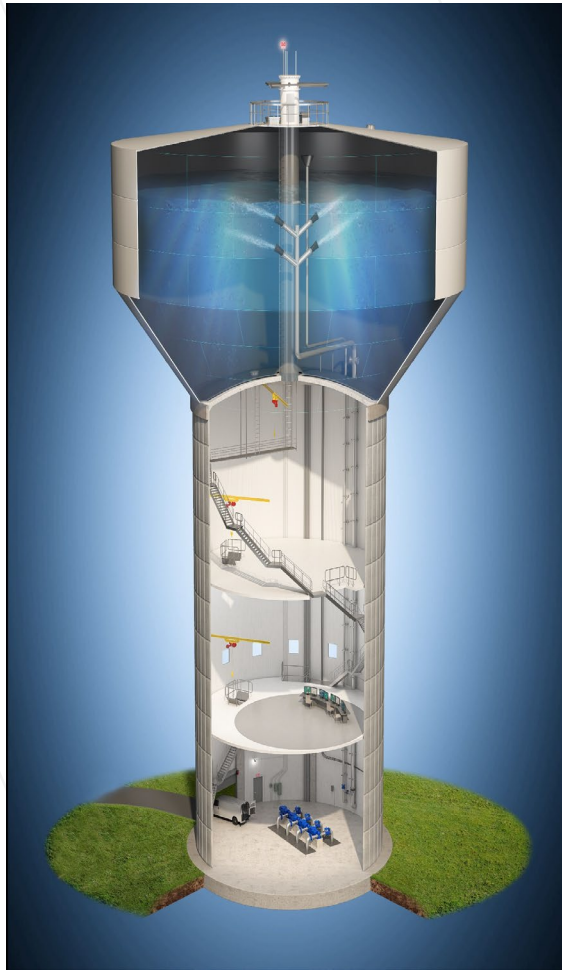
Alternative Parameters are rated 1-5 (5 being the most favorable)

\*Maximum Total Score of 500 points

# Recommendations



# Composite Tank Advantages



Comparatively Lower Capital Cost



Lower O&M Due Concrete Walls vs. Steel



Potential for Additional Uses

- Office Space
- Conference Space
- Storage
- Remote Fire Station



# Variety of Neighboring Tank Styles



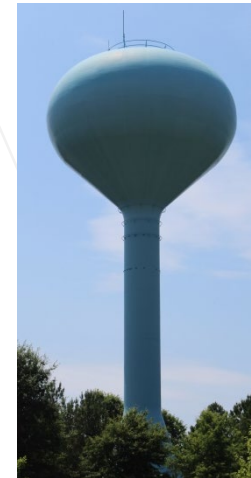
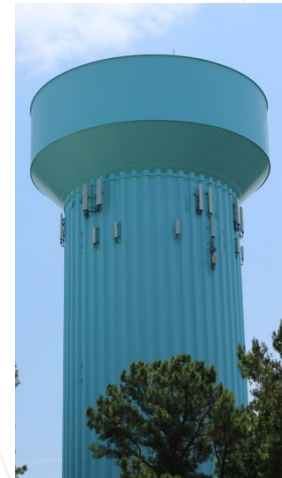
## *City of Raleigh*

- Multi-Leg
- Hydropillar
- Spheroid
- Composite



## *Town of Cary*

- Multi-Leg
- Hydropillar
- Spheroid



# 1.5MG Tank Comparison



Wooten

*A tradition of* DESIGNING THE FUTURE ▶



# TECHNICAL MEMORANDUM

**ATTN:** James Gregg  
Town of Apex, NC  
P: (919) 249-3324  
E: james.gregg@apexnc.org

**DATE:** July 12, 2022

**RE:** Apex Elevated Water Tank Engineering Analysis  
The Wooten Company  
TWC No. 2519-CK

## **1.0 Purpose and Summary**

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The Town of Apex is adding a new 1.5 million gallon (MG) elevated water storage tank to the Town's existing water distribution system. The Wooten Company was tasked by the Town to evaluate potential future tank sites and provide a recommendation on a preferred tank site. This evaluation process included meeting/discussions with Town staff and water modelling (by Town staff) to narrow the potential tank site locations to those evaluated in this memo. In addition to the tank site evaluation, an evaluation of the style of the new tank is also included in this memo.

The preferred site selection for the new Apex elevated water tank is adjacent to Pleasant Park (Tank Site No. 4) and the preferred tank style is composite. The results of each analysis are explained in further detail in subsequent sections. Figure 1 shows each evaluated tank site. Maps of the individual sites are included as **Attachment 1**.



## 2.0 Tank Site Selection

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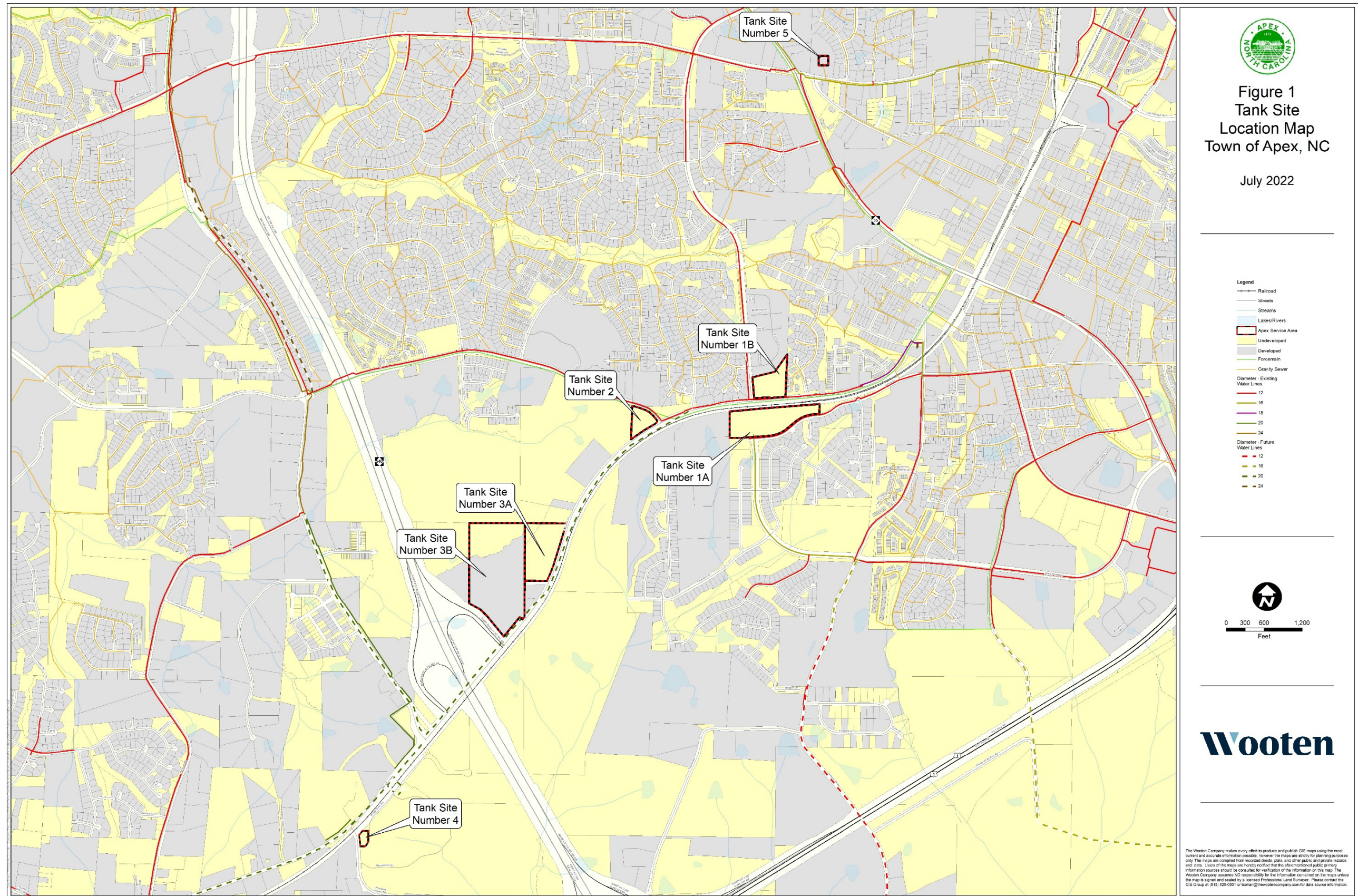
The tank site selection process included an evaluation of ten (10) criteria which were jointly determined by the Town and Wooten. A description of the criteria and evaluation metrics is below. Each criterion was assigned points and a weighting, then a weighted total score was determined for each of the potential tank site locations, as shown on Table 1. The site with the largest number of points is the preferred tank site location.

The scoring criteria were evaluated based on the following standards.

- **Water Availability** – Evaluated based on proximity to existing water distribution network. Existing network is shown on Figure 1.
- **Sewer Availability** – Evaluated based on proximity to existing sewer collection network. Existing network is shown on Figure 1.
- **Storm Water Infrastructure Availability** – Evaluated based on proximity to existing storm water collection and transmission network.
- **FAA/FCC Requirements** – Evaluated based on requirements of the Federal Aviation Administration (FAA) and Federal Communications Commission (FCC) as applicable.
- **Tank Height** – Evaluated based on a new tank overflow elevation of 616.80 ft msl and the site ground elevation.
- **Site Work** – Evaluated based on the amount of site work required for construction. Consideration given to existing site condition and near future plans for Town development.
- **Screening** – Evaluated based on the Town’s Unified Development Ordinance.
- **Setbacks** – Evaluated based on the Town’s Unified Development Ordinance .
- **Purchase Price/Availability** – Evaluated based the need to purchase for each site property. Property that is owned by the Town is scored highest, property the Town has a future goal to purchase is rated in the middle, and property the Town had no prior interest in purchasing is scored the lowest.
- **Adjacent Property Concerns** – Evaluated based on population density surrounding the tank. The number of parcels within a quarter mile radius was used to score this criteria. Maps showing the results of the adjacent property search are presented in **Attachment 2**.

The potential tank sites evaluated are shown in Figure 1. For Sites 1 and 3, there were two potential locations within the area due to parcel boundaries dividing the prime location in the area.







The potential tank sites are described below:

- Site 1: Sites A and B are located at the intersection of Salem St and Apex Peakway. Site A is located across railroad tracks south of S. Salem St. and Apex Peakway intersection. Site B is located east of the intersection of S. Salem St and Apex Peakway. The Town would have to purchase a portion of the 11.23 acre parcel containing Site A. This evaluation assumes a water main is installed as part of the Apex Peakway extension prior to tank installation. The Town currently owns the 5.6 acre parcel containing Site B. The Town is anticipated to develop both parcels as part of the Apex Peakway extension.
- Site 2: Site is located at the west corner of S. Salem St. and Apex Barbecue. This 2.87 acre parcel would need to be purchased by the Town.
- Site 3: Sites A and B are located along Salem Street northeast of I-540. It is understood the Town has future plans to purchase this land and provide water and sewer utilities to these parcels. Site A is 11 acres and Site B is 47 acres. An option may exist to purchase a smaller, 2-5 acre portion of these parcels. The Town would need to purchase either of these sites for construction.
- Site 4: Site is located on Old US 1 Highway 0.5 miles south of I540. The Town of Apex is currently constructing Pleasant Park on the property and a portion of the property may be reserved for an elevated water tank. A 20 inch water forcemain will be constructed with the new park to provide water to the elevated water tank.
- Site 5: Site is located at 736 Hunter St. The Town of Apex currently owns this parcel and uses a portion of it to house Fire Department Station 3. The water tank would be located in the parcel to allow the fire department to continue using the cleared parcel for other uses.

The availability of utilities at each site was determined by overlaying Town utilities map (provided by the Town in GIS format) in relation to corresponding site maps (See Figure 1). Sites with utilities immediately adjacent or within easy connection distance will score a 5, sites with utilities nearby will score a 3, and sites with no utilities in the area will score a 1.

In terms of the FAA criterion, Wooten utilized the FAA's on-line Notice Criteria Tool for initial FAA review. Use of the tool requires that a Notice of Proposed Construction or Alteration form be submitted for each tank site. Applications were originally submitted October 14, 2020 and applications have been closed until a final site location is determined. Based on discussions with the FAA, the FAA will not require any lighting or painting for tanks that are less than 200 ft above ground. Once a site is chosen a new FAA Notice of Proposed Construction or Alteration form will be submitted. Any FAA assigned requirements

will be incorporated into the final design. Sites that require the tank to be below 200 ft above ground level to achieve the needed water elevation will score a 5 and sites that require the tank to be above 200 ft will receive a 3. Any site that requires the tank to be painted in an unaesthetic way will be eliminated from consideration.

Federal Communication Commission (FCC) requirements for each site are anticipated to be the same with any site that is chosen. If the Town desires to place antenna structures on the proposed elevated water tank, the Town must register with the FCC and must provide with registration any painting or lighting specifications that have been received from the FAA.

Site location scoring is presented in Table 1, Site No. 4 is the highest scoring at 360. This site scores the highest primarily because 1) availability of water main, being constructed along with the new Pleasant Park, for connection to the new tank, 2) site work may be coordinated with Pleasant Park construction on site, and 3) the Town of Apex already owns the site. Sites 1 and 5 scored the second highest, primarily due to water availability and the Town already having plans for land near the sites. Site 2 scored third highest, primarily due to utility availability and tank height. Finally, Sites 3 A and B scored lowest as they are further from existing water and sewer utilities, require a taller tank, and require more site improvement work. Some of the criteria had little influence on the tank selection (stormwater utilities, FAA requirements, and setback requirements) due to similar requirements for these criteria between the sites.

**Table 1: Site Selection Decision Matrix**

Criteria	Weight	Potential Sites for Locating New Elevated Water Storage Tank													
		No. 1A		No. 1B		No. 2		No. 3A		No.3B		No. 4		No. 5	
Water Availability	10	4**	40	5	50	4	40	2	20	2	20	5	50	5	50
Storm Water Infrastructure Availability	5	3	15	3	15	3	15	3	15	3	15	3	15	3	15
FAA/FCC Requirements	5	5	25	5	25	5	25	3	15	3	15	3** *	15	5	25
Tank Height	15	4	60	4	60	4	60	1	15	1	15	1	15	4	60
Site Work	10	5	50	5	50	1	10	1	10	1	10	3	30	5	50
Screening	5	1	5	1	5	3	15	5	25	5	25	5	25	1	5
Setbacks/Height Restrictions	5	3	15	3	15	3	15	3	15	3	15	3	15	3	15
Purchase Price/Availability	15	3	45	3	45	3	45	3	45	3	45	5	75	5	75
Adjacent Property Concerns	25	1	25	1	25	3	75	5	125	5	125	4	100	1	25
<b>Total Score*</b>		<b>280</b>		<b>290</b>		<b>300</b>		<b>285</b>		<b>285</b>		<b>340</b>		<b>320</b>	

Alternative Parameters are rated 1-5 (5 being the most favorable).

\*Maximum Total Score of 500 points.

\*\* Score is based on anticipated water main installation with Apex Peakway extension, without water main the category score will be reduced to 1 and total score reduced to 250

\*\*\* Potential for additional FAA requirements which will eliminate it from consideration.

### **3.0 Tank Style Selection**

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Four tank styles were evaluated for this project: Multi-Leg, Composite, Hydropillar, and Spheroid. Tank supplier brochures for each style are presented in **Attachment 3**. The evaluation of the tank style includes six (6) criteria that were weighted in terms of importance to determine the best style of tank for the Apex Elevated Water Tank, as shown on Table 2.

The scoring criteria were evaluated based on the following standards.

- **Capital Cost** – Evaluated based on capital cost for each tank type as provided by tank suppliers.
- **Maintenance Cost** – Evaluated based on maintenance costs provided by Town’s existing tank O&M contractor, SuezWater Technologies.
- **Aesthetics** – Evaluated based on subjective impression and previous experience.
- **Interior Space** – Evaluated based on useable space within the tank column interior.
- **Communication Corral Options** – Evaluated based on usable space on the tank bowl/top for placement of communication equipment.
- **Life Cycle Cost** – Evaluated based on capital and maintenance costs over a 20-year period.

Table 2 list scoring results of the tank style analysis:

**Table 2: Tank Style Decision Scoring Matrix**

Parameters	Weight	Types of Elevated Water Storage Tanks							
		Multi-Leg		Composite		Hydropillar		Spheroid	
Capital Cost	25	4	100	5	125	2	50	2	50
Maintenance	20	1	20	4	80	3	60	5	100
Aesthetics	10	1	10	3	30	4	40	5	50
Interior Space	15	0	0	5	75	5	75	3	45
Communication Corral Options	5	3	15	4	20	3	15	3	15
Life Cycle Cost	25	3	75	5	125	3	75	4	100
<b>Total Score*</b>		<b>220</b>		<b>455</b>		<b>315</b>		<b>360</b>	

Alternative Parameters are rated 1-5 (5 being the most favorable).

\*Maximum Total Score of 500 points.

The capital cost for each tank style were provided by four vendors for various heights between 160 ft and 220-ft based on tank elevations at each site. A summary table of costs for each tank style from the four suppliers is provided in **Attachment 4**. The capital costs include shallow foundation system, tank fabrication and erection, and shop priming and painting. These assumptions were used for all tank styles and site locations to ensure even comparison. Based on the information provided by the tank suppliers, the average capital costs for each tank style are listed below:

**Average Capital Cost**

Multi-leg	\$3,977,000
Composite	\$3,739,200
Hydropillar/fluted column	\$4,347,000
Spheroid/pedesphere	\$4,129,750

Annual operation and maintenance (O&M) costs for each tank style were estimated by contacting the Town’s existing tank O&M contractor Utility Services (Suez) and requesting an annual O&M budget for each tank style. Based on correspondence with Utility Service Co, Inc (Suez) (**Attachment 4**) the O&M costs for each tank style are listed below:

	<u>Annual Est. O&amp;M, \$/yr</u>
Multi-leg	\$50,000
Composite	\$32,890
Hydropillar/fluted column	\$39,402
Spheroid/pedesphere	\$27,893

The aesthetics of each style is dependent on preference, but generally speaking the multi-leg is the least desirable in regards to aesthetics. The composite and hydropillar/fluted column can be considered a more industrial look while the spheroid/pedesphere tank is generally considered sleek and attractive. Availability of interior space will provide housing for the control valves in the base which will eliminate the need for external valve vaults. This would require minimal interior space and could be satisfied by the composite, hydropillar/fluted column, and the spheroid/pedesphere type tanks but not the multi-leg tank.

The communication corral options vary based on the style of tank. Per an elevated water tank vendor, the maximum roof handrail diameter for the multi-leg, hydropillar/fluted column, and spheroid/pedesphere is 30 feet with the standard diameter ranging from 15 to 20 feet. The standard handrail diameter for a composite tank (standard cone roof) is a few feet less than the diameter of the tank. A 1.5 MG composite tank (standard cone roof) would range in diameter from 50-ft to 58-ft and the handrail could be extended to within a few feet of the edge of the roof to allow for the greatest quantity of communication equipment.

The final criterion to determine tank style is the life cycle cost. The life cycle cost was analyzed based on the estimated construction cost and the 20-year present worth cost of the annual tank operations and maintenance costs. The salvage value was not considered as part of the life cycle cost evaluation because the life cycle of an elevated tank is much longer than twenty (20) years and in general there is little or no salvage value of a demolished tank. A comparison table for life-cycle costs for each tank style is provided in **Attachment 4**. The results of the life cycle cost analysis were as follows:

	<u>Life Cycle Cost, \$</u>
Multi-Leg	\$4,771,000
Composite	\$4,262,200
Hydropillar	\$4,973,000
Spheroid	\$4,572,750

The composite tank has the lowest life cycle cost of the four tank styles.



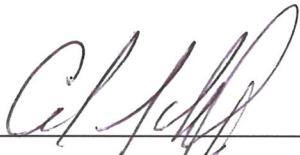
## 4.0 Conclusion

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Based on the evaluation conducted, a composite tank located east of the south of I-540 on Old US 1 Hwy (Site 4) is the highest scoring location. Town staff have reviewed this memo and concur with this selection. We are prepared to begin the design of the chosen alternative once the Town of Apex notifies us to proceed forward.

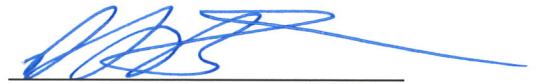
Sincerely,

**THE WOOTEN COMPANY**



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Carl W. Scharfe, PE  
Project Manager/Process Engineer



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David Bennett, PE  
Project Engineer

### ATTACHMENTS:

Attachment 1:

Tank Site Maps

Attachment 2:

Site Adjacent Property Maps

Attachment 3:

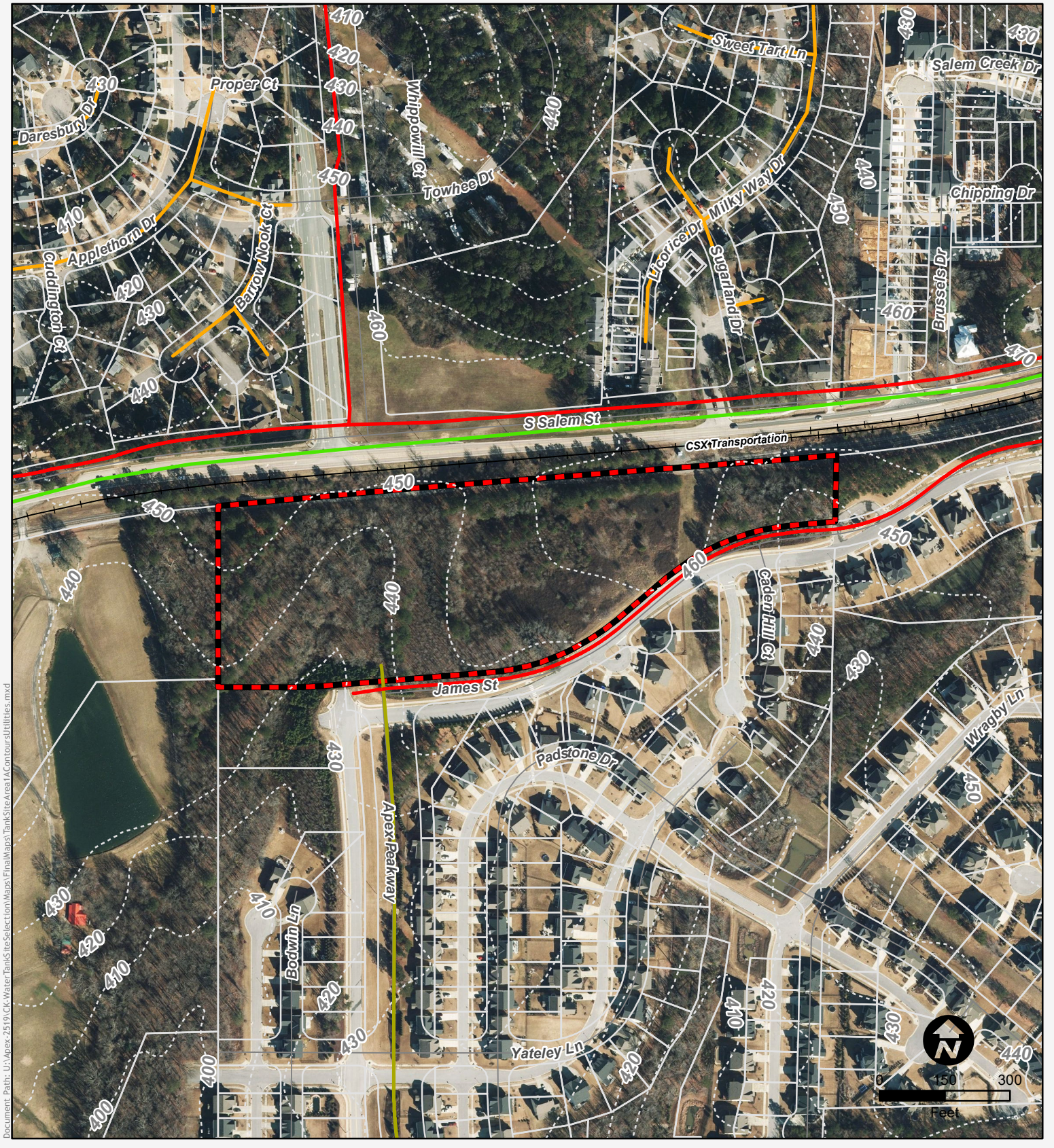
Tank Style Information

Attachment 4:

Capital, O&M, and Life Cycle Costs

## **TANK SITE MAPS**





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## Area 1A Tank Site Apex, NC

July 2022

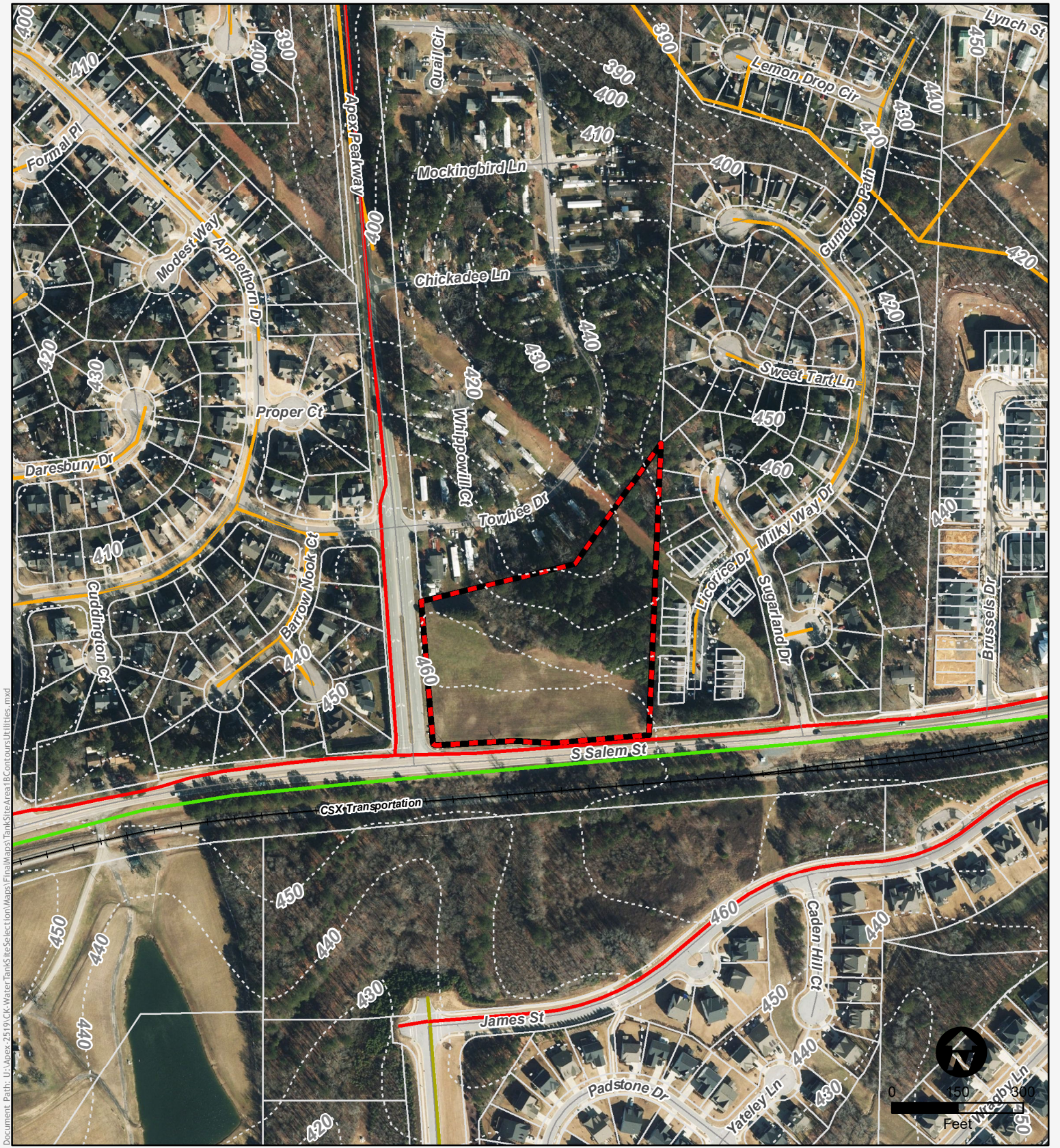
### Legend

- Street
- Railroad
- 10' Contour
- Existing 12" Water Line
- Existing 16" Water Line
- Forcemain
- Gravity Sewer
- Area 1A Tank Site
- Parcel



The Wooten Company makes every effort to produce and publish GIS maps using the most current and accurate information possible. However, the maps are strictly for planning purposes only. The maps are compiled from recorded deeds, plats, and other public and private records and data. Users of the maps are hereby notified that the aforementioned public primary information sources should be consulted for verification of the information on this map. The Wooten Company assumes NO responsibility for the information contained on the maps unless the map is signed and sealed by a licensed Professional Land Surveyor. Please contact the GIS Group at (919) 628-0531 or toohan@thewootencompany.com for data source information.





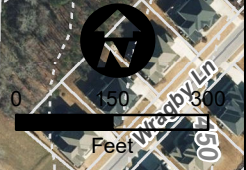
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## Area 1B Tank Site Apex, NC

July 2022

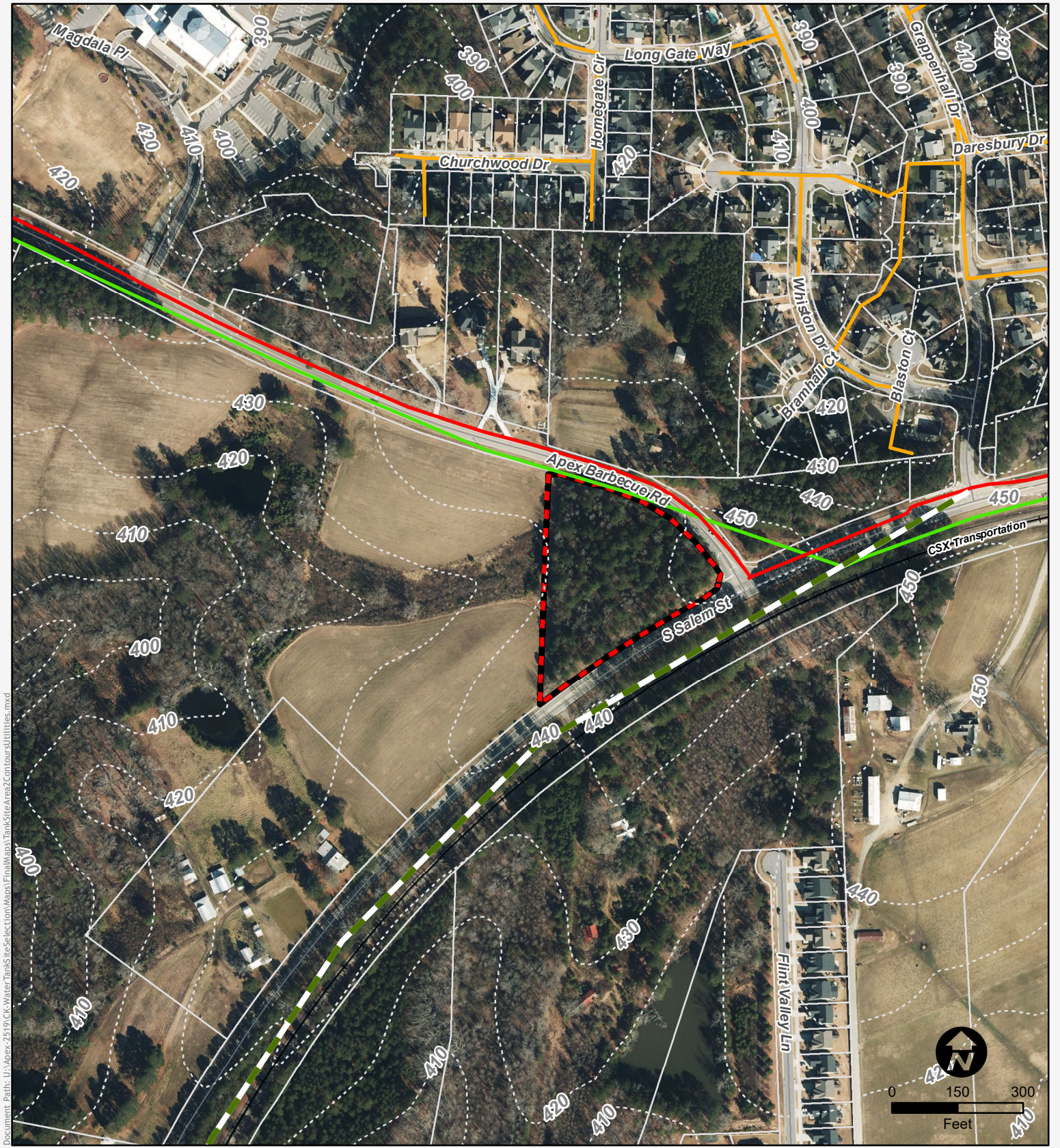
### Legend

- Street
- Railroad
- 10' Contour
- Existing 12" Water Line
- Existing 16" Water Line
- Gravity Sewer
- Area 1B Tank Site
- Parcel



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## Area 2 Tank Site Apex, NC

July 2022

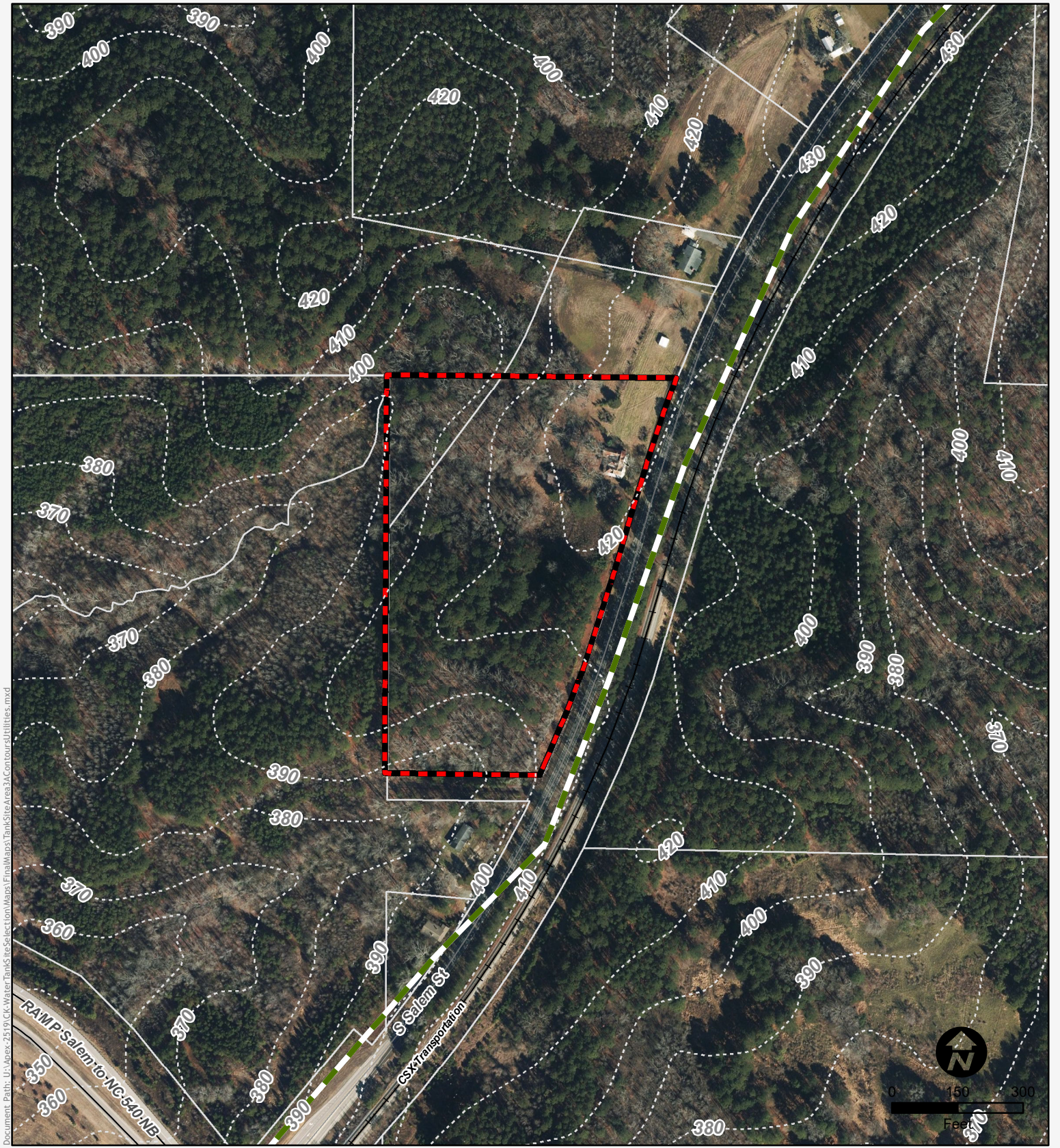
### Legend

- Street
- Railroad
- 10' Contour
- Existing 12" Water Line
- Future 20" Water Line
- Gravity Sewer
- Area 2 Tank Site
- Parcel

# Wooten

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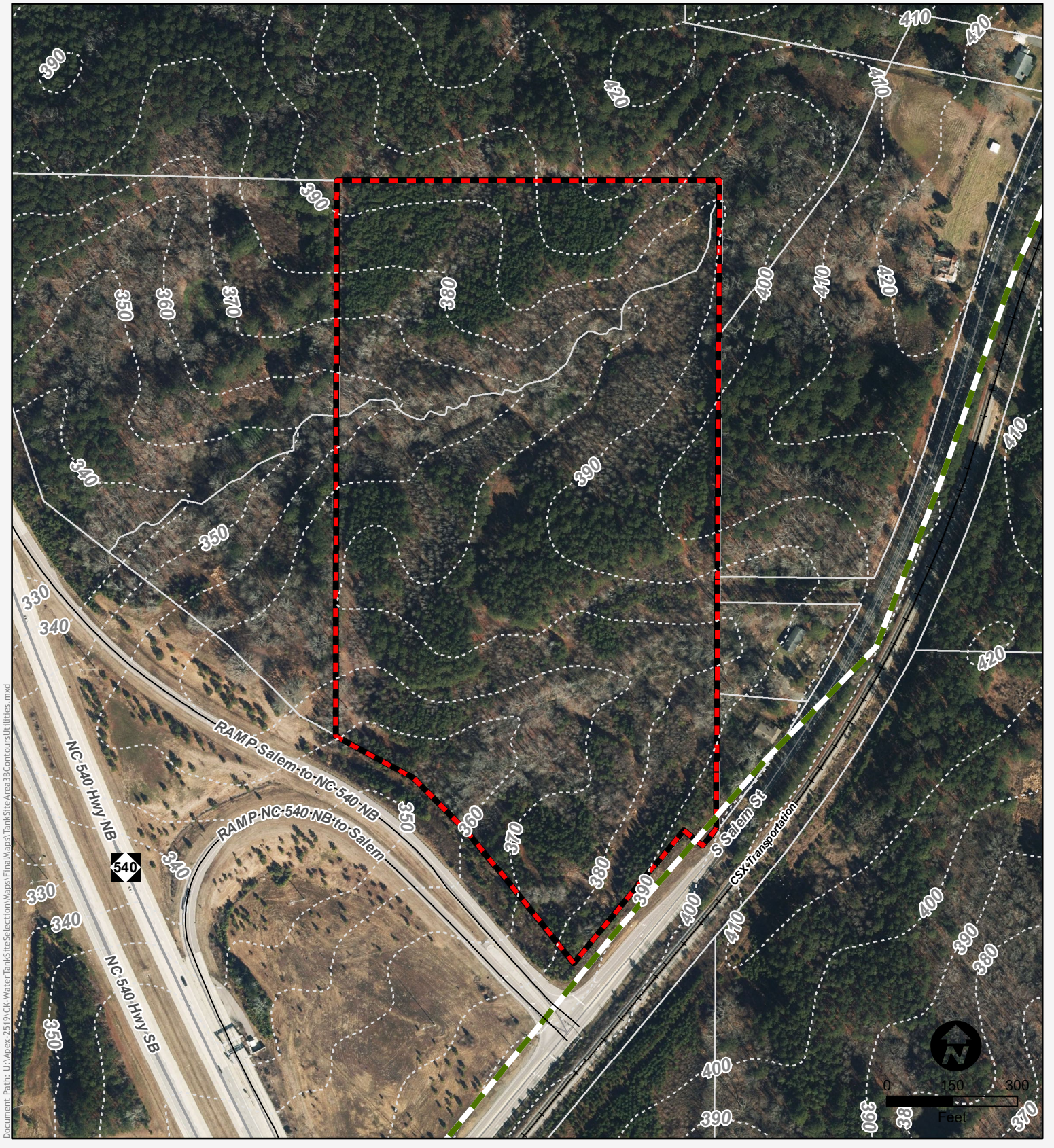
**Area 3A Tank Site**  
 Apex, NC  
 July 2022

- Legend**
- Street
  - 10' Contour
  - Future 20" Water Line
  - Area 3A Tank Site
  - Parcel



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## Area 3B Tank Site Apex, NC

July 2022

- Legend**
- NC Route
  - Ramp
  - Street
  - - - 10' Contour
  - Future 20" Water Line
  - Area 3B Tank Site
  - Parcel



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**Area 4 Tank Site**  
**Apex, NC**  
 July 2022

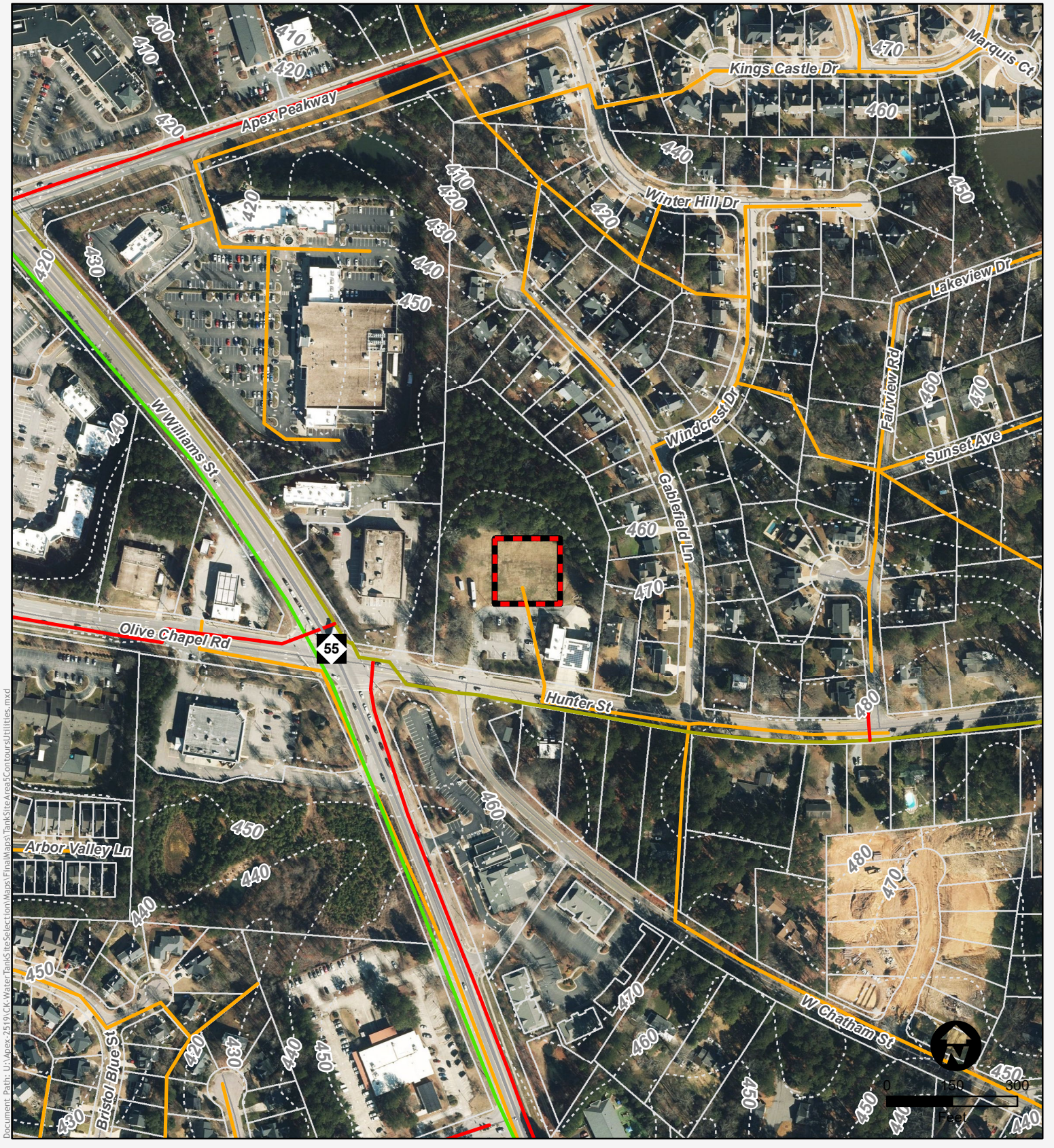
**Legend**

- Street
- +— Railroad
- - - - 10' Contour
- Future 20" Water Line
- Parcel
- ▭ Area 4 Tank Site

**Wooten**

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## Tank Site Area 5 Apex, NC

July 2022

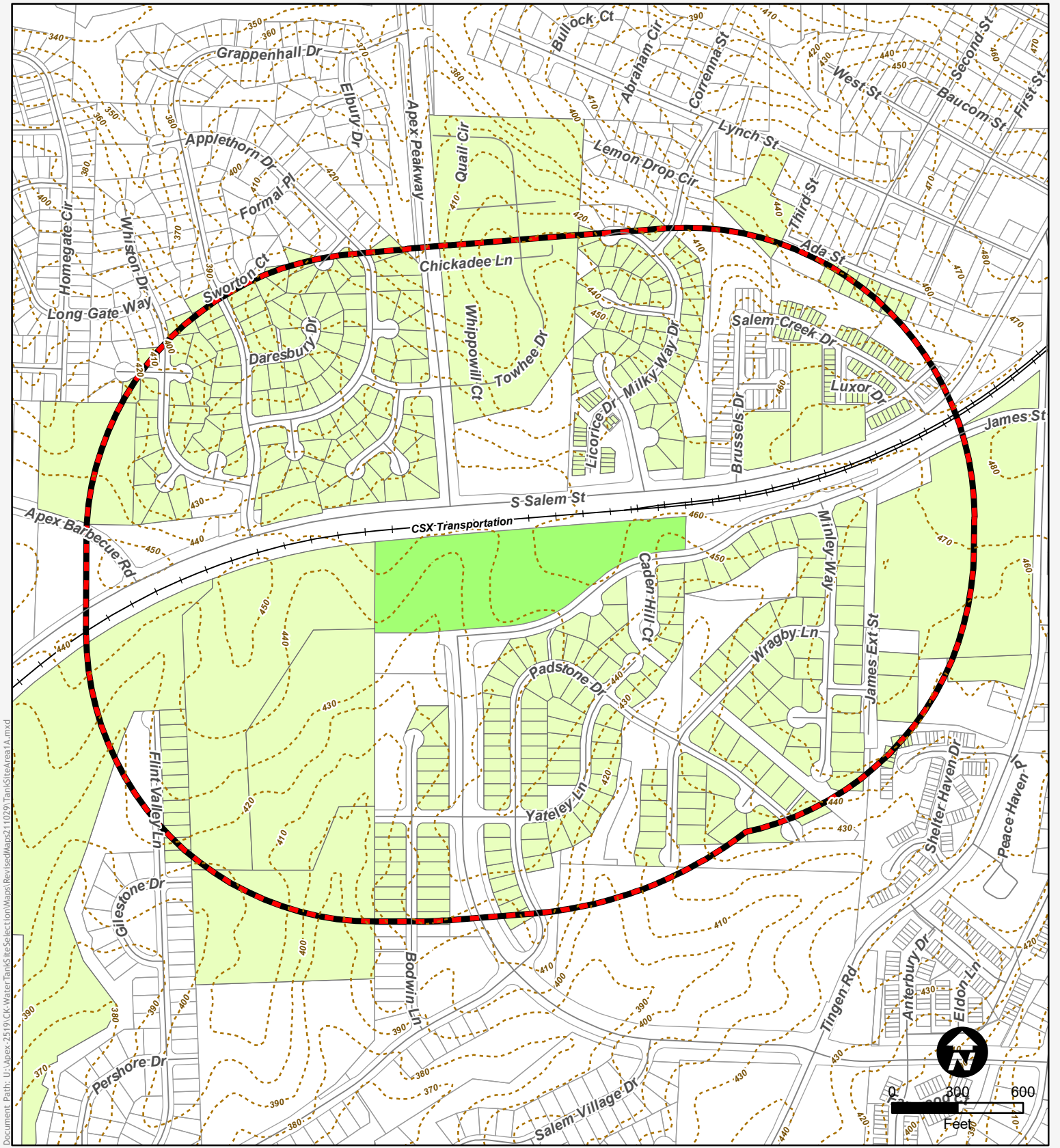
- Legend**
- NC Route
  - Street
  - 10' Contour
  - Existing 12" Water Line
  - Existing 16" Water Line
  - Forcemain
  - Gravity Sewer
  - Area 5 Tank Site
  - Parcel



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## **SITE ADJACENT PROPERTY MAPS**


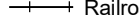






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## Area 1A Tank Site Apex, NC

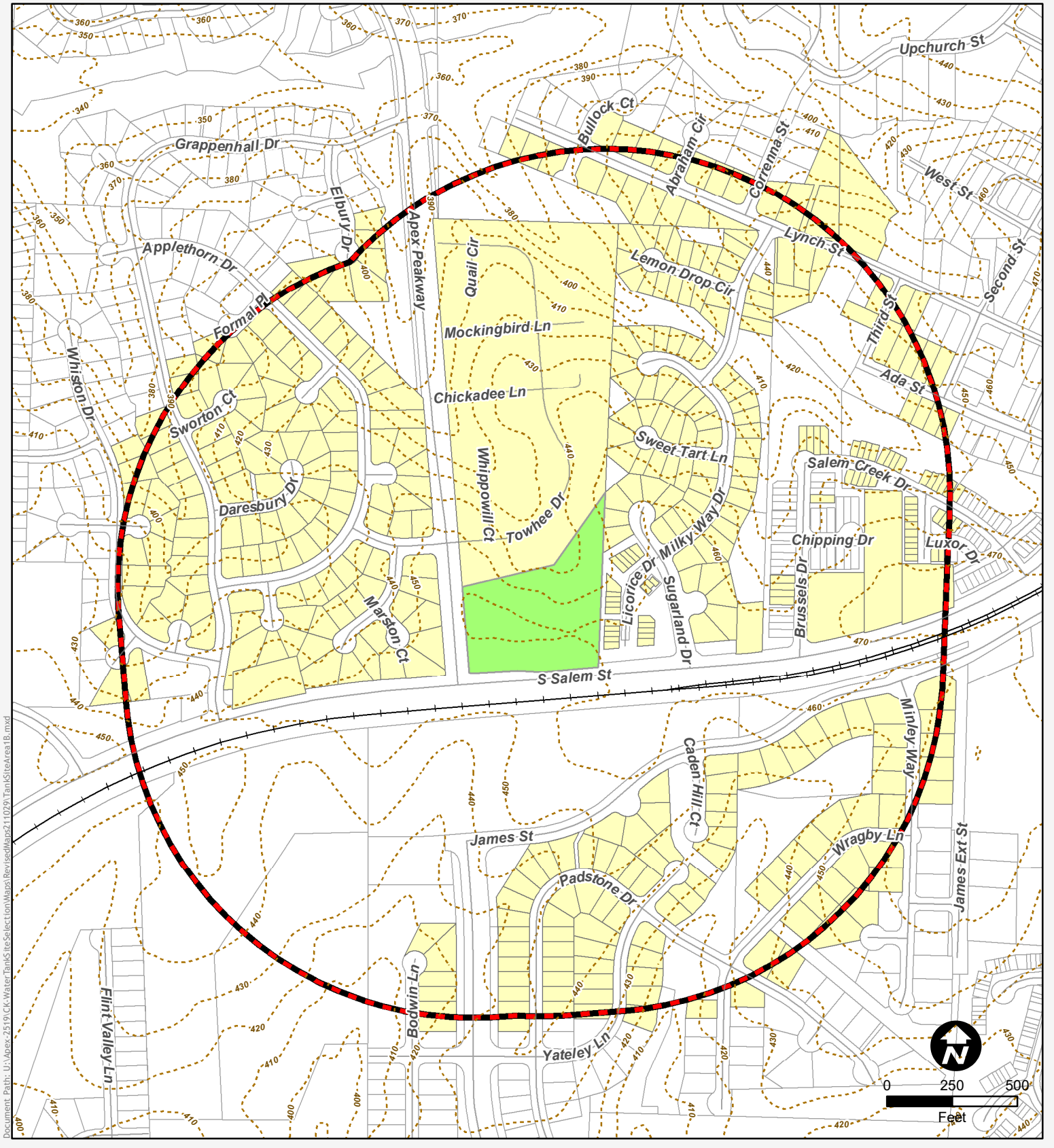
November 2021

### Legend

-  Street
-  Railroad
-  10' Contour
-  One Quarter Mile Study Area
-  Area 1A Tank Site
-  Area 1A Residential Parcel (446)
-  Parcel

# Wooten

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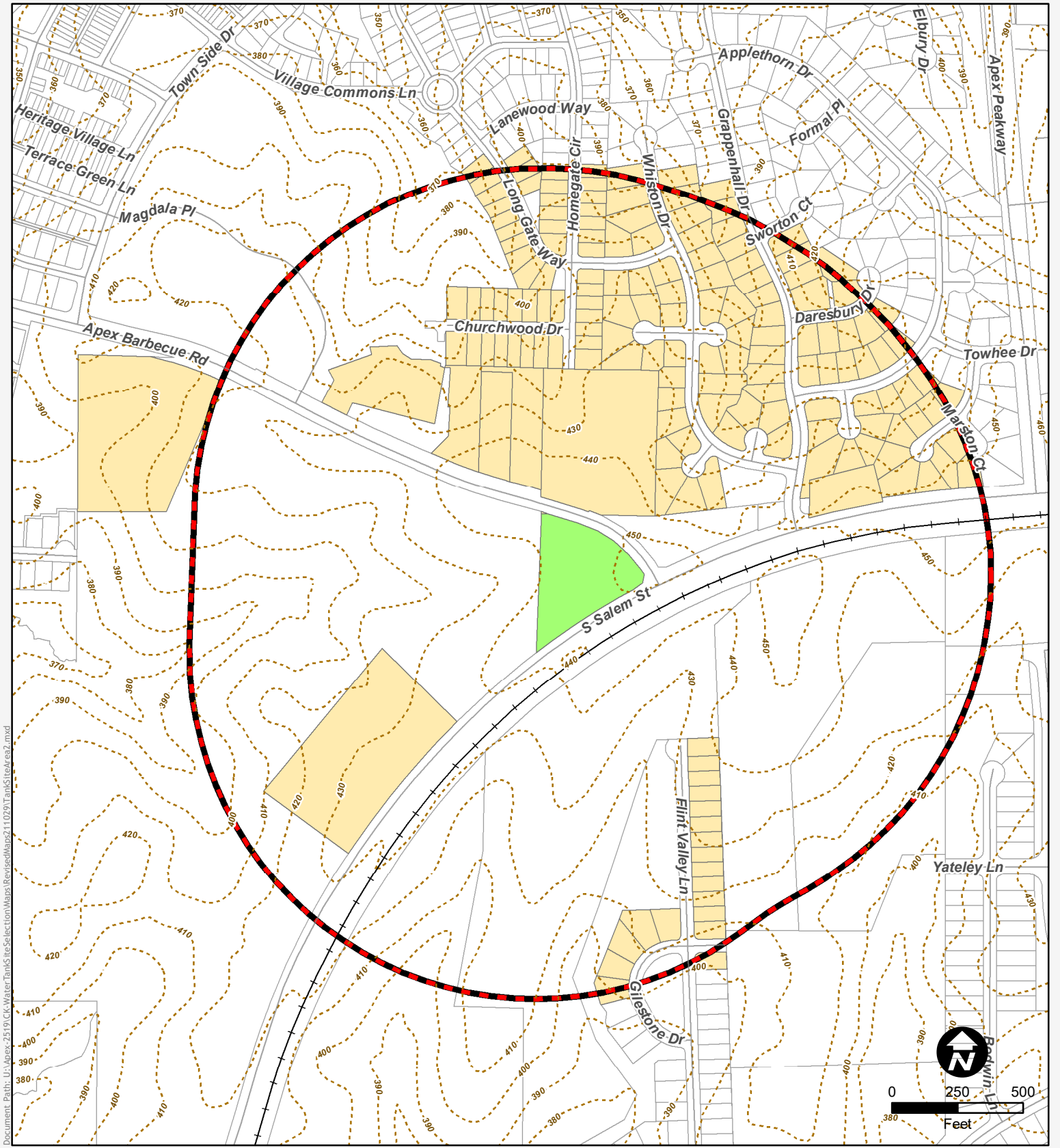
**Area 1B Tank Site**  
**Apex, NC**  
 November 2021

- Legend**
- Street
  - +— Railroad
  - - - - 10' Contour
  - ▭ One Quarter Mile Study Area
  - ▭ Area 1B Tank Site
  - ▭ Area 1B Residential Parcel (417)
  - ▭ Parcel

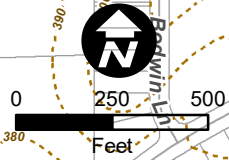


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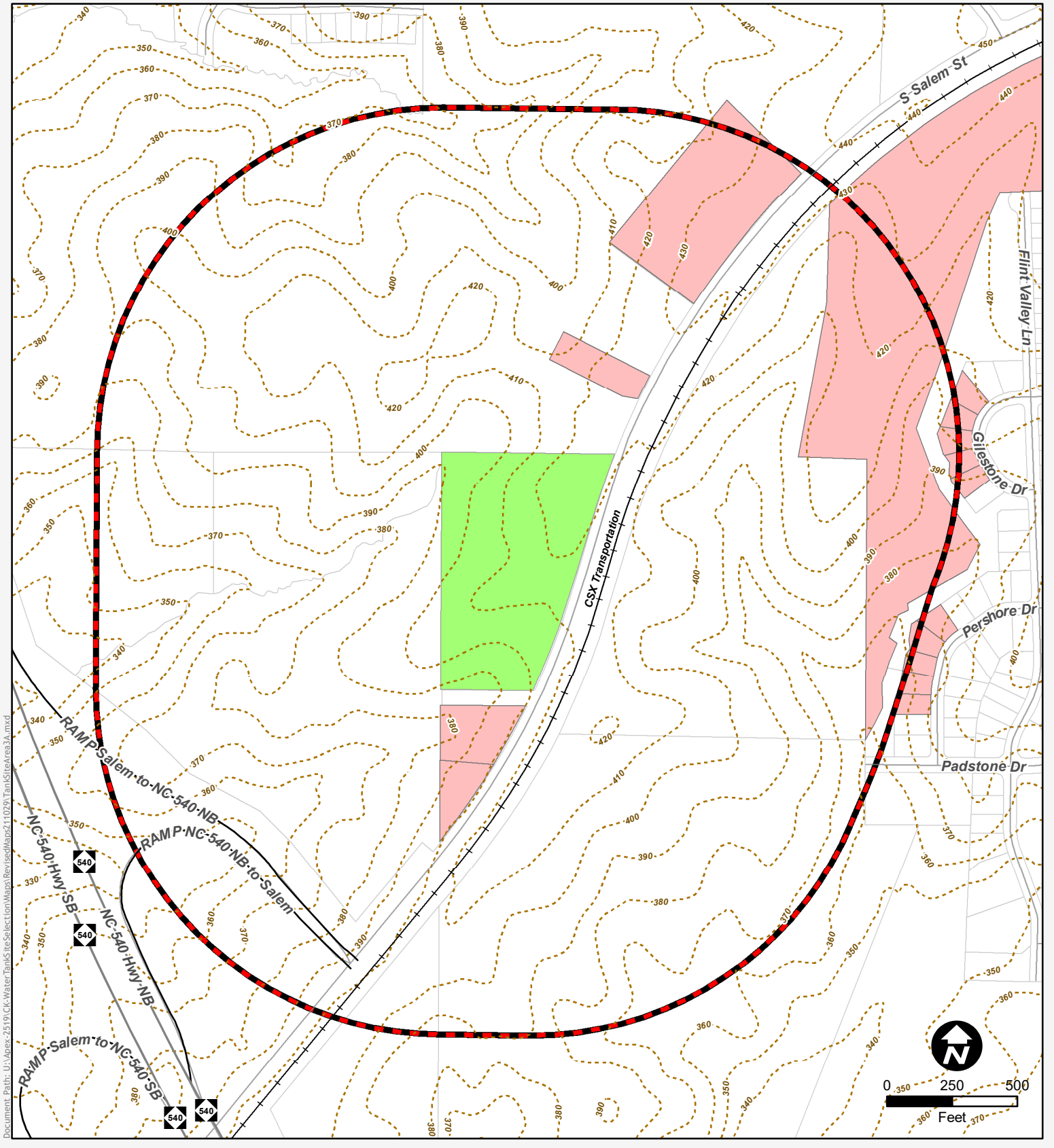
**Area 2 Tank Site**  
**Apex, NC**  
 November 2021

- Legend**
- Street
  - Railroad
  - 10' Contour
  - One Quarter Mile Study Area
  - Area 2 Tank Site
  - Area 2 Residential Parcel (166)
  - Parcel



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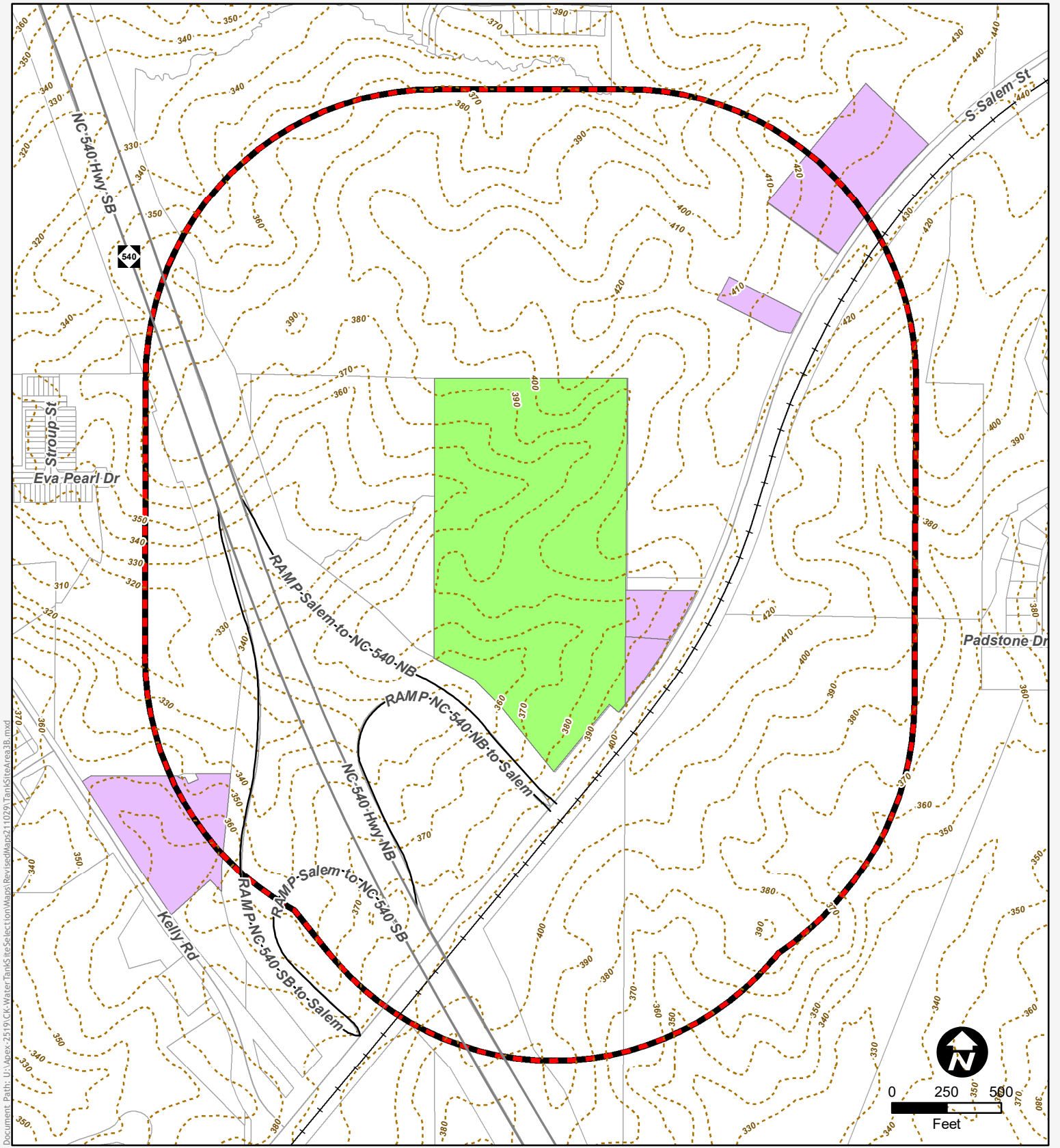
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**Area 3A Tank Site**  
**Apex, NC**  
 November 2021

- Legend**
- Street
  - Railroad
  - 10' Contour
  - One Quarter Mile Study Area
  - Area 3A Tank Site
  - Area 3A Residential Parcel (15)
  - Parcel



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Document Path: U:\Apex\2519\CK-Water Tank Sites\Selection\Map\Revised\Map211029\TankSiteArea3B.mxd  
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## Area 3B Tank Site Apex, NC

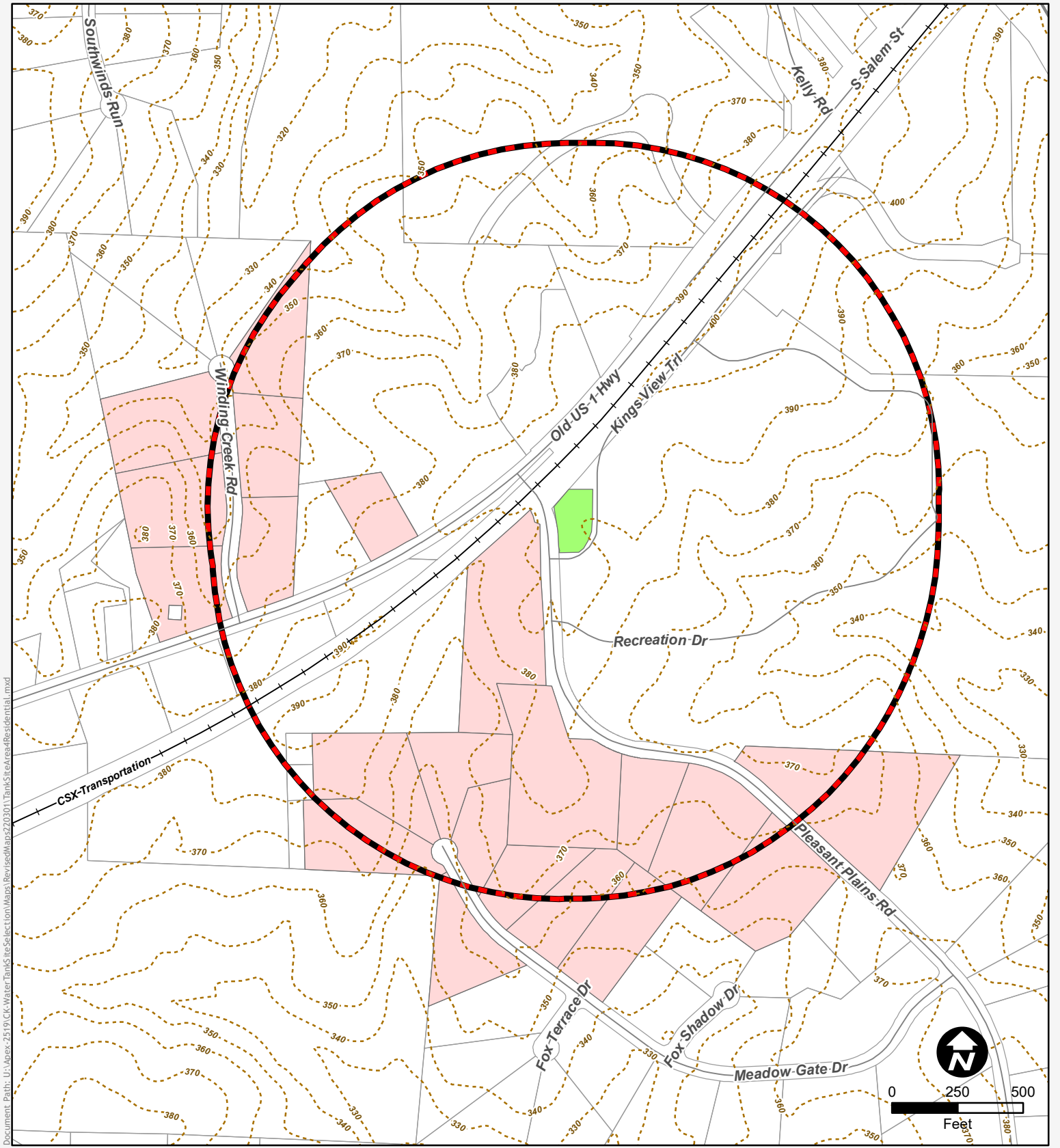
November 2021

### Legend

-  Street
-  Railroad
-  10' Contour
-  One Quarter Mile Study Area
-  Area 3B Tank Site
-  Area 3B Residential Parcel (5)
-  Parcel

# Wooten

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Document Path: U:\Apex\2519\CK-Water Tank Site\Selection Maps\Revised\Map202301 TankSite\area4residential.mxd  
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**Area 4 Tank Site**  
**Apex, NC**  
 March 2022

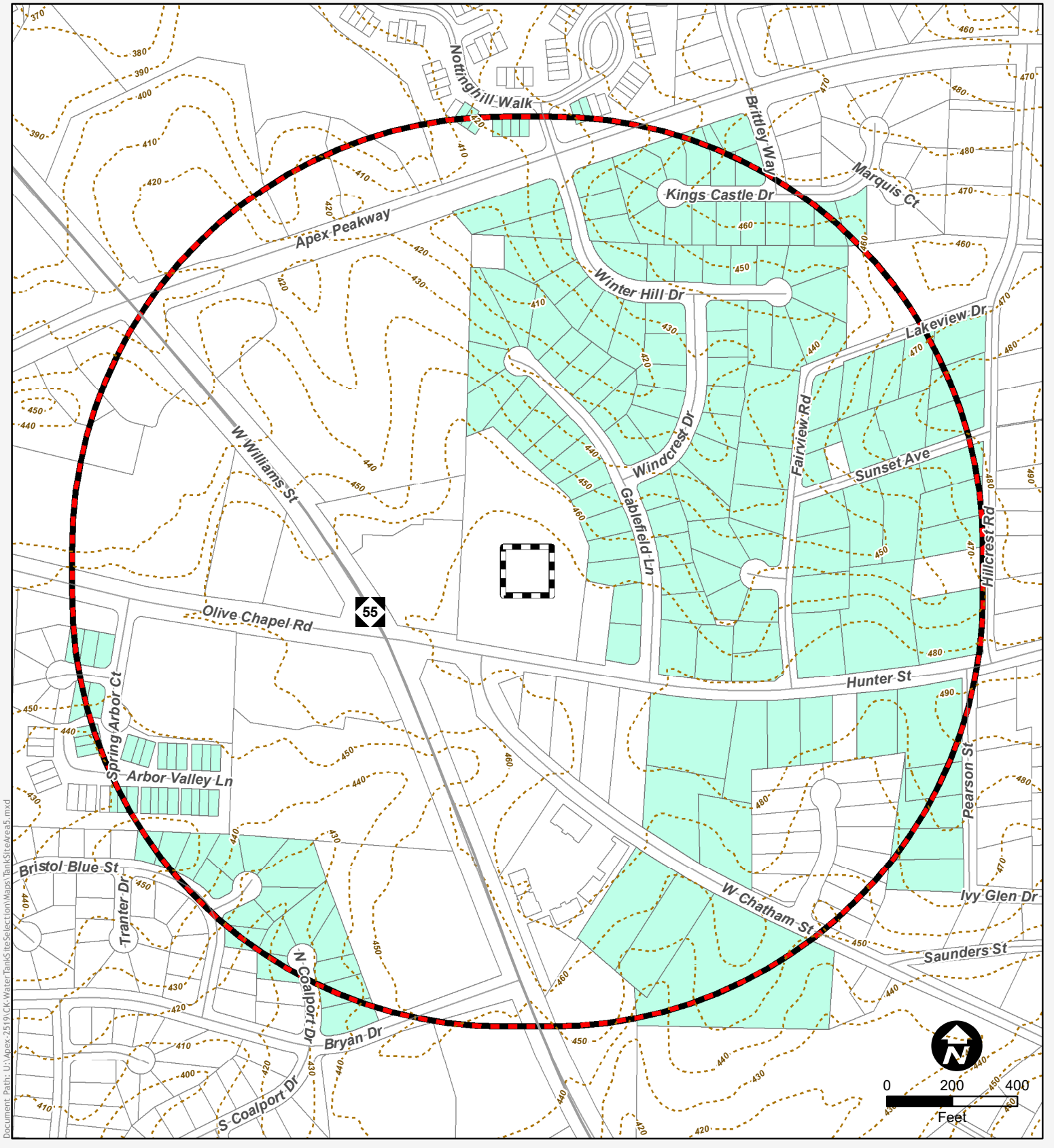
**Legend**

- Street
- Railroad
- 10' Contour
- Parcel
- One Quarter Mile Study Area
- Area 4 Tank Site
- Area 4 Residential Parcel (21)



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## Tank Site Area 5 Apex, NC

June 2022

- Legend**
- Street
  - 10' Contour
  - One Quarter Mile Study Area
  - Area 5 Residential Parcel (178)
  - Tank Parcel
  - Parcel



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## **TANK STYLE INFORMATION**





Charter Township of  
*Northville*



# Waterspheroid®

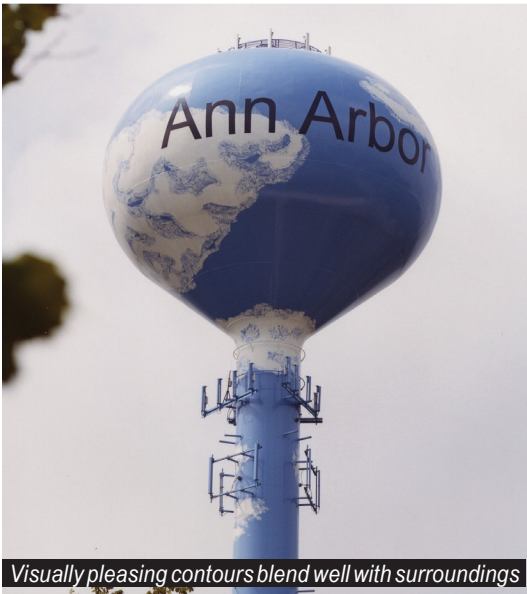
Elevated Water Storage

CB&I Storage Tank Solutions  
[mcdermott.com](http://mcdermott.com)

**MCDERMOTT**



*Modern sleek design*



*Visually pleasing contours blend well with surroundings*



*Attractive graphics enhance community identity*

## Why a CB&I Waterspheroid® elevated tank?

Proven to be the most popular of all single pedestal elevated water storage tank styles, the Waterspheroid elevated tank is available in storage capacities from 150,000 to 2,000,000 gallons. It offers low capital and maintenance costs, enhanced safety/security, convenient storage, and a small footprint that minimizes land requirements.

With its sleek design and pleasing contours the Waterspheroid tank is well suited for high visibility locations such as school grounds, commercial developments, residential neighborhoods, parks and other prominent locations.

CB&I invented the Waterspheroid tank design, and we have built more single pedestal steel spheroidal elevated tanks than any other company, including the tallest and largest capacity tanks in service. CB&I has the most experience in the industry in the art of forming the ball. We use larger steel plates than our competitors which leads to a smoother ball shape with fewer weld seams, minimizes potential areas of paint failure and reduces long-term paint maintenance of the tank.

In addition, CB&I uses double-curved, hot pressed knuckles between the bell and the shaft and between the shaft and the ball. Not only does this add to the smooth line aesthetics of the tank, it eliminates the potential lamellar tearing that could occur on tanks using dollar plates and coned sections in these areas.

Waterspheroid tanks are all-steel, all-welded structures that have proven reliability, serving thousands of municipalities and industries for decades. Properly maintained and operated, steel tanks offer an extremely long life, with some structures exceeding 100 years of service.

Since the construction of our first elevated tank in 1894, CB&I has become a global leader in the design and construction of elevated water storage tanks. We pioneered the transition to welded steel tanks in the 1930s, invented the original Watersphere® tank in 1939, the larger Waterspheroid® tank in 1954, and have been improving the concept ever since. We also have been instrumental in the development of the AWWA standards, beginning with the first D100 Standard in 1941, continuing today through active organization and committee participation.

## Taking the Lead with QHSES

McDermott is committed to setting a leading example in all areas of Quality, Health, Safety, Environment and Security, and encourages our partners, subcontractors and clients to join us in the pursuit of outstanding QHSES performance. Taking the Lead is a company-wide initiative that brings a single, united QHSES culture to our diverse workforce and organization, a culture where setting the right example in QHSES attitude and behavior is simply 'In our DNA.'







Optional roof mounted antennae



Unhindered maintenance access



Piping and valves in base



More pleasing appearance, lower maintenance and superior security than multi-column tanks

## Selecting a CB&I Waterspheroid® elevated tank

CB&I Storage Tank Solutions provides sample specifications and detail drawings for engineers and owners who are planning Waterspheroid projects. Contact CB&I's regional sales force to receive guidance on specifying your tank or visit [www.mcdermott.com/water](http://www.mcdermott.com/water) to view our standard specifications and drawings.

### Aesthetic design

- ③ Smooth contours
  - The most popular single pedestal style in use
  - Visually pleasing, modern design
- ③ Blends well with surroundings
- ③ Capitalizes on high visibility locations
  - Optional lettering and logos enhance community identity and pride
  - Custom ornamental and specialty paint designs available

### Economics

- ③ Low capital expenditure
- ③ All-steel composition permits cost effective, year-round construction
- ③ Small footprint permits "tight sites" and minimizes land cost
- ③ Turnkey supply of foundation and painting offers cost and schedule savings
- ③ Eliminates costly and unsightly fencing
- ③ Height can be modified if pressure requirements change after installation
- ③ At end of life cycle, tank can be demolished at minimal cost

### Maintenance

- ③ Style minimizes interior and exterior painted surface area and future maintenance
- ③ Interior dry surfaces are weather protected and seldom need repainting
- ③ Maintenance access to all exterior surfaces is unhindered

### Safety and security

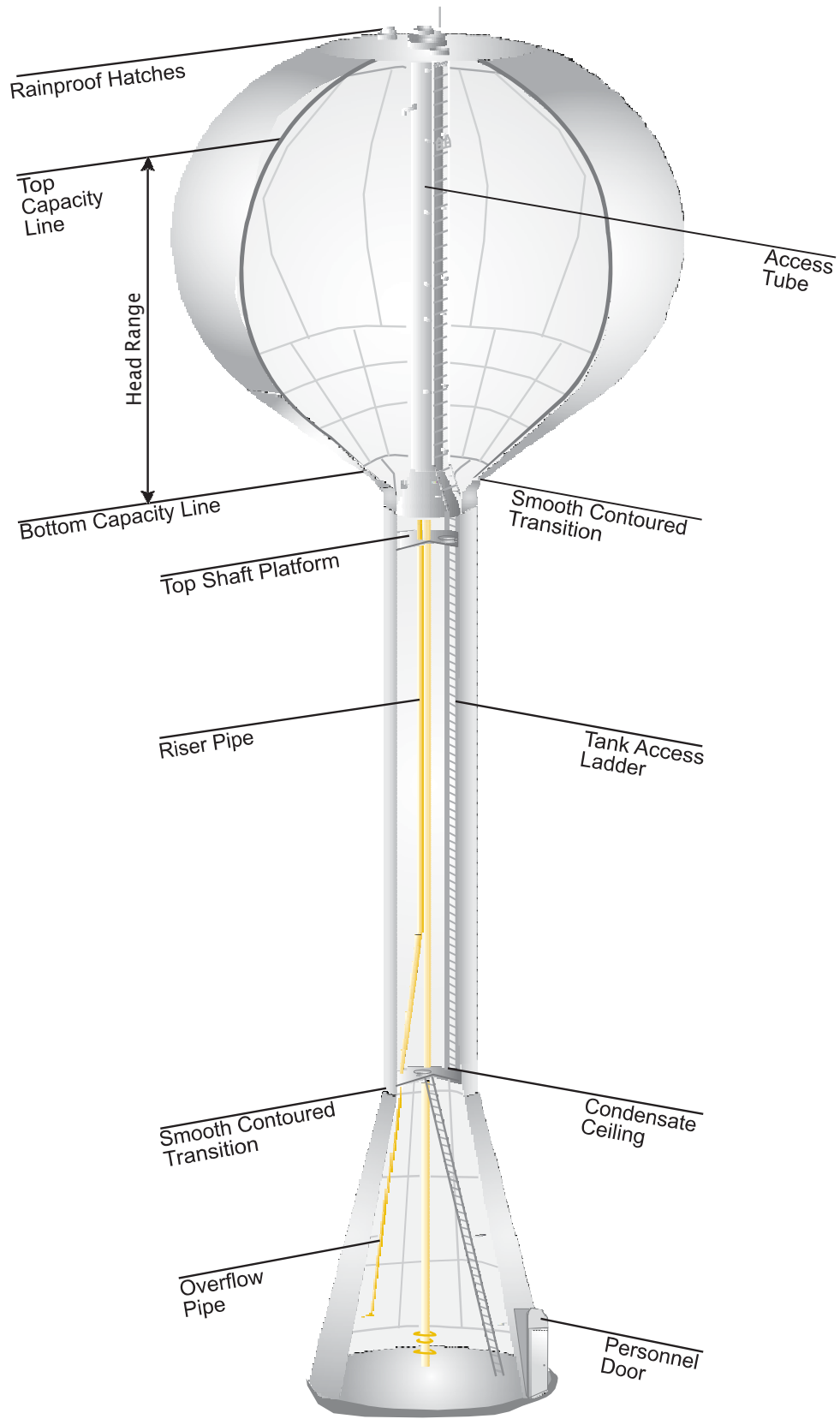
- ③ Solid, flush threshold steel door with deadbolt lock restricts unauthorized entry
- ③ Enclosed interior access ladders
  - Minimize vandalism and unsightly graffiti
  - Minimize unauthorized tank access
  - Facilitate climbing during inclement weather
- ③ Proven performance in high wind events (tornadoes and hurricanes)

### Multi-purpose space inside bell

- ③ Optionally insulated and heated
- ③ Provides space for multiple uses, such as:
  - Tool and equipment storage
  - Pumps, valves, piping and controls
  - Telecommunication equipment
- ③ Flush threshold personnel door allows easy access for storage



# Standard features and options





## Standard features

- ③ One 36 in. wide by 80 in. high steel personnel door with flush threshold
- ③ Concrete floor inside base
- ③ Steel riser pipe with expansion joint
- ③ Steel overflow pipe to grade with splash block
- ③ Steel condensate ceiling with drain
- ③ Ladders in pedestal and access tube
- ③ Safety devices on ladders as required by state and federal regulations
- ③ Steel top shaft platform with one 30 in. diameter manway in top shaft platform
- ③ One 30 in. diameter manway in condensate ceiling
- ③ One 42 in. diameter access tube
- ③ Painter's rings at top of pedestal
- ③ One 24 in. diameter painter's ring hatch
- ③ Two 30 in. diameter roofhatches
- ③ One 24 in. diameter painter's ventilation roof hatch
- ③ Minimum 1/4" thick steel roof plates
- ③ Seal welding underside of roof
- ③ Fail-safe roofvent
- ③ Interior lighting in pedestal and access tube

## Options

- ③ Lettering, logos and decorative graphics
- ③ Alternative style as composite elevated tank or Hydropillar®
- ③ Ornamental and specialty styling
- ③ FreshMix™ circulation system
- ③ Double personnel door
- ③ Overhead door
- ③ Valve vault inside base
- ③ Control room inbase
- ③ Dual risers
- ③ Stainless steel riser
- ③ Stainless steel overflow
- ③ Riser insulation and heat tracing
- ③ Intermediate platforms
- ③ Seal welding of pedestal appurtenances
- ③ Upsized 48 in. diameter or 60 in. diameter access tube
- ③ Tank drain
- ③ Internal tank ladder on access tube
- ③ Roof handrail
- ③ External security or decorative lighting
- ③ FAA lighting
- ③ Instrumentation
- ③ Telemetry
- ③ Cathodic protection
- ③ Lightning protection
- ③ Antenna penetrations and supports

## Standard capacities and dimensions

Capacity U.S. Gallons	Spheroid Diameter ft-in.	Head Range ft-in.
150,000	35 - 0	30 - 0
200,000	39 - 10	30 - 0
250,000	42 - 10	32 - 6
300,000	46 - 6	32 - 6
400,000	50 - 8	37 - 6
500,000	55 - 10	37 - 6
600,000	58 - 2	40 - 0
750,000	64 - 8	40 - 0
1,000,000	74 - 8	40 - 0
1,250,000	79 - 2	45 - 0
1,500,000	86 - 0	46 - 0
2,000,000	93 - 0	52 - 0





Northville, MI – 1,000,000 gallons



Gonzales, LA – 1,000,000 gallons



Batavia, IL – 750,000 gallons



Shorewood, IL – 1,500,000 gallons



Wentzville, MO – 2,000,000 gallons







*Custom paint options*





McDermott is a premier, fully-integrated provider of technology, engineering and construction solutions to the energy industry. For more than a century, customers have trusted McDermott to design and build end-to-end infrastructure and technology solutions to transport and process oil and gas into the products the world needs today. Our proprietary technologies, integrated expertise and comprehensive solutions deliver certainty, innovation and added value to offshore, subsea and downstream energy projects around the world.

### **Corporate Office**

757 N. Eldridge Parkway  
Houston, TX 77079  
Tel: +1 281 870 5000

**[mcdermott.com](http://mcdermott.com)**



# AESTHETICS



**MULTI-LEG**



**COMPOSITE**

# AESTHETICS



**SPHEROID**



**COMPOSITE**



# AESTHETICS

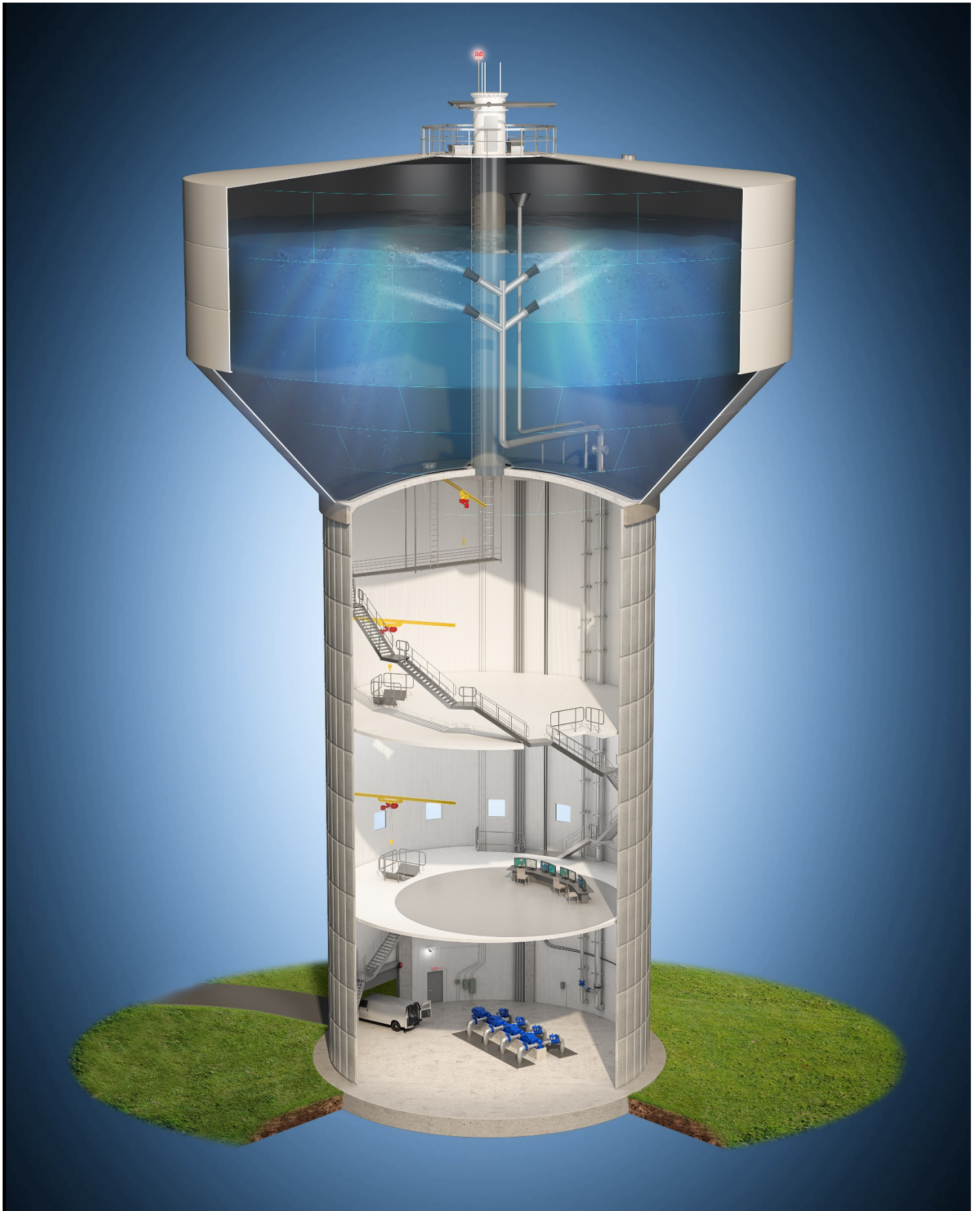


**FLUTED COLUMN**

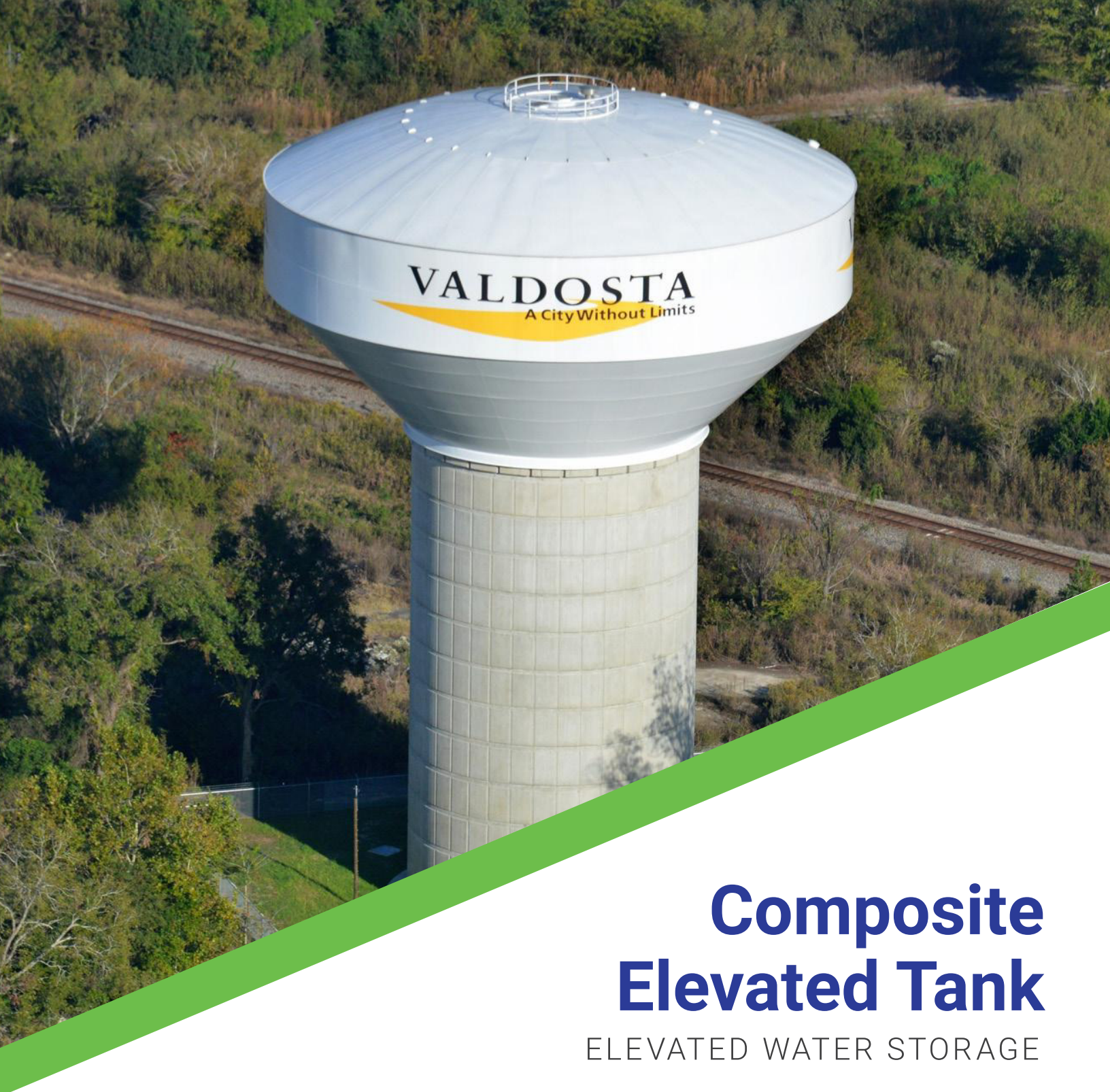


**COMPOSITE**









# Composite Elevated Tank

ELEVATED WATER STORAGE

[mcdermott.com](http://mcdermott.com)

**MCDERMOTT**

**CB&I  
STORAGE  
SOLUTIONS**





Sizes range from 500,000 to 3,500,000 gallons. Above is a 1,500,000 gallon tank



Architectural lines blend well with surrounding structures and landscapes



Concrete support structure requires minimum maintenance on both inside and exterior



3,000,000 gallon tank in Souderton, PA

### Why choose a composite elevated tank?

The tensile strength of steel has long been recognized as a characteristic most effective in producing leak-free water-retaining vessels. Reinforced concrete is one of the most efficient and economical materials to carry compressive loads. A composite elevated tank (CET) combines these materials to produce an efficient, long-lasting structure.

A CET from CB&I Storage Solutions can be a cost effective solution for large-capacity tanks. The low maintenance requirements of the interior and exterior of the support structure minimize long-term ownership costs.

We have designed and built hundreds of CET's of various capacities and heights since their introduction to the marketplace.

Our concrete forming system (forms, ties and bulkheads) minimizes pour lines and allows proper vibration of the concrete, reducing bug holes and honeycombing to obtain architectural grade concrete. We install a 1/4 inch thick formed steel liner over the concrete dome, which minimizes voids between the concrete and steel and meets the AWWA D107 minimum thickness requirement for plates in contact with water.

The self-supporting dome roof minimizes interior structural supports in the vapor area of the tank where condensation occurs. Since this is the most corrosion-prone area in the tank, future maintenance requirements are reduced.

The concrete support structure exterior is enhanced by an architectural pattern that blends well with surrounding structures. In addition, the exterior coating and logo on the steel tank can be custom designed to identify your municipality, company or product.

Since the construction of our first elevated tank in 1894, we have become a global leader in the design and construction of elevated water storage tanks. We pioneered the transition to welded steel tanks in the 1930s and built our first Composite Elevated Tank in 1986. We also have been instrumental in the development of the AWWA D107 Standard for composite elevated tanks.

### Taking the Lead with QHSES

McDermott is committed to setting a leading example in all areas of Quality, Health, Safety, Environment and Security, and encourages our partners, subcontractors and clients to join us in the pursuit of outstanding QHSES performance. Taking the Lead is a company-wide initiative that brings a single, united QHSES culture to our diverse workforce and organization, a culture where setting the right example in QHSES attitude and behavior is simply 'in our DNA.'



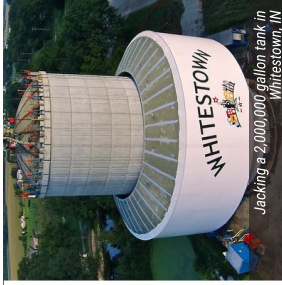
Standard designs provide efficient head ranges from 35-50 ft to minimize pumping costs and variations in water pressure



Piping and valves in support structure



Piping and valves in support structure



Jacking a 2,000,000 gallon tank in Whitestown, IN



Painting tank exterior prior to jacking

### Selecting a composite elevated tank

CB&I Storage Solutions sample specifications and detail drawings for engineers and owners who are planning (Composite elevated tank / Hydro pillar tank / Waterspheroid) projects. Contact our regional sales force to receive guidance on specifying your tank or visit [www.mcdermott.com/water](http://www.mcdermott.com/water) to view our standard specifications and drawings.

#### Maintenance

- Concrete support structure requires minimal maintenance
- Maintenance access to all exterior surfaces is unhindered

#### Multi-purpose interior space

- Dual use as offices, meeting rooms, pump station, fire station, equipment and machinery storage, etc.
- Reinforced concrete support structure
  - Easily integrates with interior structural steel for multiple floors
  - Allows exterior windows
  - Offset riser pipe maximizes available interior space

#### Economics

- Can be economical in larger capacities
- Effective cost is reduced when the value of the interior space is considered
- Turnkey supply of foundation and painting offers cost and schedule savings

#### Aesthetic design

- Clean modern appearance
- Vertical and horizontal architectural lines blend well with surrounding structures and landscapes
- Capitalizes on high visibility locations
  - Optional lettering and logos enhance community identity and pride
  - Optional custom architectural concrete support structure designs available

#### Safety and security

- Solid threshold steel door with deadbolt lock restricts unauthorized entry
- Overhead door
  - Quick entry and exit for trucks and large equipment
  - Easy access for larger storage items
- Enclosed interior access ladders
  - Minimizes vandalism and unsightly graffiti
  - Minimizes unauthorized tank access
  - Facilitates climbing during inclement weather

#### Optimum head range

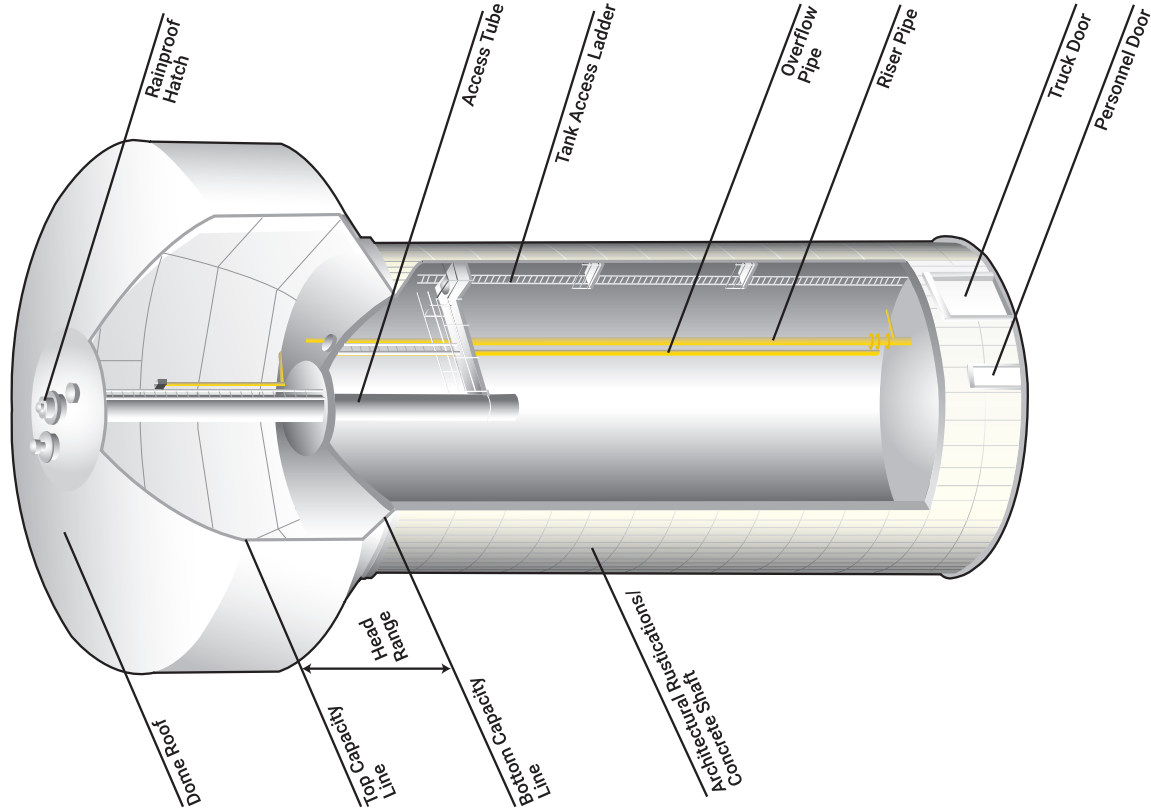
- Standard design provides efficient head range
  - Minimizes pumping costs
  - Minimizes variation in water pressure
- Optional head ranges available

#### Dome roofs

- Improves appearance
- No ponding or bird baths
- Reduces topside corrosion and dirt streaks on tank exterior
- Minimizes snow and ice accumulation



## Standard features and options



### Standard features

- One 36" wide by 80" high personnel door with threshold
- Concrete floor inside base
- Stainless steel riser pipe with expansion joint
- Steel overflow pipe in tank with weir box
- Stainless steel overflow pipe to grade with splash block
- Galvanized ladders and platforms in support structure
- Safety devices on ladders as required by state and federal regulations
- Galvanized walkway with handrails from top of support structure to access tube hatch
- One 48" diameter access tube
- Painted ladder in access tube
- Painter's rings at top of support structure
- Tank drain
- One 24" wide by 36" high painter's ring hatch with louver
- One 30" tank bottom manway with access ladder to walkway
- Two 30" diameter roof hatches
- One 24" diameter painter's ventilation roof hatch
- Minimum 1/4" thick steel roof plates
- Seal welding underside of roof
- Interior lighting in support structure and access tube
- Lightning protection

### Options

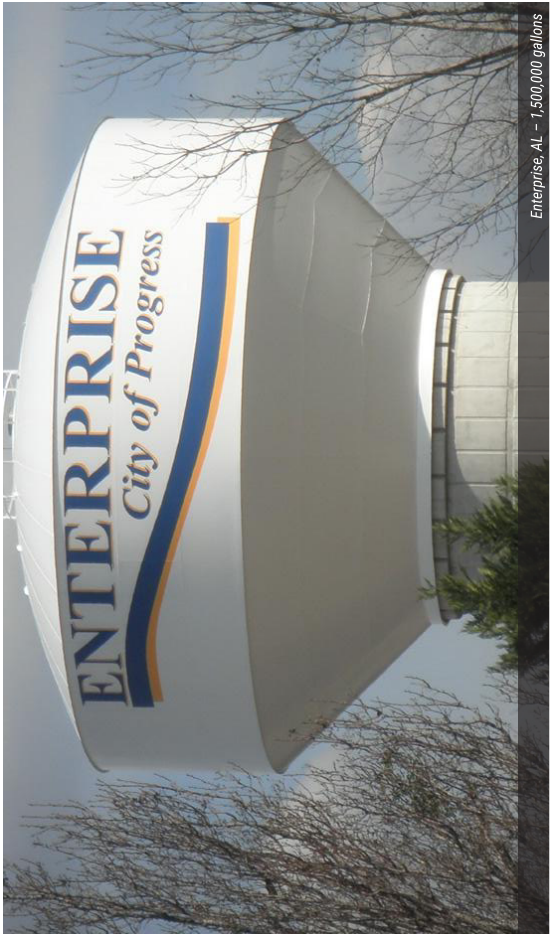
- Lettering, logos and decorative graphics
- Alternate style (as Waterspheroid® tank or Hydropillar)
- Architectural concrete support structure
- FreshMix® circulationsystem
- Structural framing, multiple floors and ceilings inside the support structure
- Additional openings in support structure (e.g., windows)
- Double personnel door
- Overhead doors
- Valve vault inside base
- Control room in support structure
- Dual risers
- Riser insulation and heat tracing
- Alternative ladder arrangements inside support structure
- Exterior access tube ladder
- Upsized 60 in. or 72 in. diameter access tube
- Internal tank ladder on access tube
- Exterior access tube ladder
- Roof handrail
- External security or decorative lighting
- FAA lighting
- Instrumentation
- Telemetry
- Cathodic protection
- Antenna penetrations and supports

## Standard capacities and dimensions

Capacity U.S. Gallons	Tank Diameter* ft.-in.	Head Range** ft.-in.	Support Structure Diameter ft.-in.
500,000	50 - 0	37 - 6	28 - 0
600,000	62 - 0	32 - 6	28 - 0
750,000	59 - 0	40 - 0	32 - 0
1,000,000	70 - 0	40 - 0	36 - 0
1,250,000	79 - 0	40 - 0	40 - 0
1,500,000	81 - 0	45 - 0	44 - 0
2,000,000	93 - 0	45 - 0	52 - 0
2,500,000	105 - 0	45 - 0	52 - 0
3,000,000	110 - 0	50 - 0	60 - 0
3,500,000	118 - 0	50 - 0	60 - 0

\* Tank diameters based on listed/standard head ranges only.

\*\* CB&I Storage Solutions has other head ranges and support structure diameters available for each capacity tank. Please contact us if you need assistance.



Enterprise, AL - 1,500,000 gallons



Greenville Inn, SC - 2,000,000 gallons



League City, TX - 2,000,000 gallons



Charleston, SC - 1,500,000 gallons



Edin Prairie, MN - 2,000,000 gallons



Canton, MS - 1,500,000 gallons



Brownsburg, IN - 1,000,000 gallons





**CB&I**  
**STORAGE**  
**SOLUTIONS**

McDermott's storage business, CB&I Storage Solutions, is the world's leading designer and builder of storage facilities, tanks and terminals. With more than 59,000 structures completed throughout our 130-year history, CB&I Storage Solutions has the global expertise and strategically located operations to provide our customers world-class storage solutions for even the most complex energy infrastructure projects.

### **Corporate Office**

915 N. Eldridge Parkway  
Houston, TX 77079  
Tel: +1 281 588 6600

**[mcdermott.com](http://mcdermott.com)**



**KEOKUK**

# Hydropillar®

ELEVATED WATER STORAGE

[mcdermott.com](http://mcdermott.com)

**MCDERMOTT**

**CB&I**  
STORAGE  
SOLUTIONS

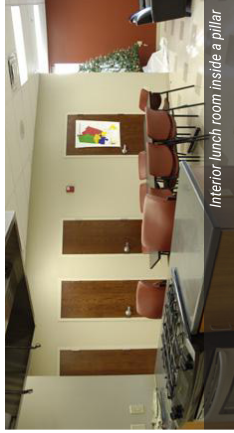




Multi-purpose treatment laboratory and office facility  
SIT/SPA Tank of the Year



Largest single pedestal elevated tank in  
the United States - 4,100,000 gallons



Interior lunch room inside a pillar



Attractive graphics enhance community identity

## Why choose a Hydropillar® elevated tank?

CB&I Storage Solutions invented the original Hydropillar tank design in 1962 and has been improving the concept ever since. We have built more fluted column elevated tanks than any other company, including the tallest and largest capacity tanks in service. Our unique dome roof design eliminates ponding, which improves paint durability and reduces streaking on the side of the tank. The self-supporting dome roof also minimizes interior structural supports in the vapor area of the tank where condensation occurs. Since this is the most corrosion-prone area in the tank, future maintenance requirements are reduced.

The Hydropillar tank design offers a high degree of customization and flexibility. The space inside the pillar can be used in a wide variety of innovative ways, or it can be reserved for future expansion. Many sizes, options and features are available, and storage capacities range from 200,000 gallons to more than 4,000,000 gallons. In smaller capacities an optional wineglass style offers additional attractive and creative applications.

Hydropillar tanks are all-steel, all-welded structures that have proven reliability, serving municipalities and industries for decades. The vertical steel flutes accentuate the clean, modern design. The large diameter steel pillar also offers excellent stiffness to earthquake loads, superior suitability for low load-bearing soil, and unobstructed access for exterior inspection and maintenance. Properly maintained and operated, steel tanks offer an extremely long life, with some structures exceeding 100 years of service.

## Taking the Lead with QHSES

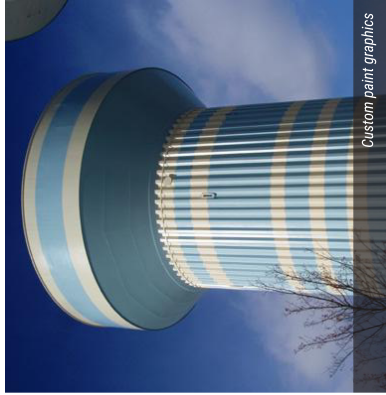
McDermott is committed to setting a leading example in all areas of Quality, Health, Safety, Environment and Security, and encourages our partners, subcontractors and clients to join us in the pursuit of outstanding QHSES performance. Taking the Lead is a company-wide initiative that brings a single, united QHSES culture to our diverse workforce and organization, a culture where setting the right example in QHSES attitude and behavior is simply 'in our DNA'.



Dual storage -  
620,000 gallons upper tank and  
1,130,000 gallons lower tank.  
(SIT/SPA Tank of the Year)



Multi-purpose fire station



Custom paint graphics

## Selecting a Hydropillar elevated tank

We provide sample specifications and detail drawings for engineers and owners who are planning Hydropillar tank projects. Contact our regional sales force to receive guidance on specifying your tank or visit [www.mcdermott.com/water](http://www.mcdermott.com/water) to view our standard specifications and drawings.

### Multi-purpose interior space

- Dual use as offices, meeting rooms, pump station, fire station, equipment and machinery storage, etc.
- Steel fluted column (i.e., pillar)
  - Easily integrates with interior structural steel for multiple floors
  - Allows exterior windows
  - Offset riser pipe maximizes available interior space

### Economics

- Especially economical in larger capacities
- All-steel construction permits cost-effective, year-round construction
- Large diameter fluted column is particularly advantageous in high earthquake zones or on soil with low load bearing capacity
- Effective cost is reduced when the value of the interior space is considered
- Turnkey supply of foundation and painting offers cost and schedule savings
- Height can be modified if pressure requirements change after installation
- At end of life cycle, tank can be demolished at minimal cost

### Aesthetics

- Clean, modern appearance
- Vertical architectural lines blend well with surrounding structures and landscapes
- Capitalizes on high visibility locations
  - Optional lettering and logos enhance community identity and pride

### Safety and security

- Solid, flush threshold steel door with deadbolt lock restricts unauthorized entry
- Optional overhead door
  - Quick entry and exit for trucks and large equipment
  - Easy access for larger storage items
- Enclosed interior access ladders
  - Minimizes vandalism and unsightly graffiti
  - Minimizes unauthorized tank access
  - Facilitates climbing during inclement weather

### Maintenance

- Interior dry surfaces are weather-protected and seldom need repainting
- Maintenance access to all exterior surfaces is unhindered

### Optimum head range

- Standard design provides efficient head range
  - Minimizes pumping costs
  - Minimizes variation in water pressure
- Optional head ranges available

### Dual water storage compartment capability

- Can serve two different pressure systems
- Can provide dual owners with separate water storage

### Dome roofs

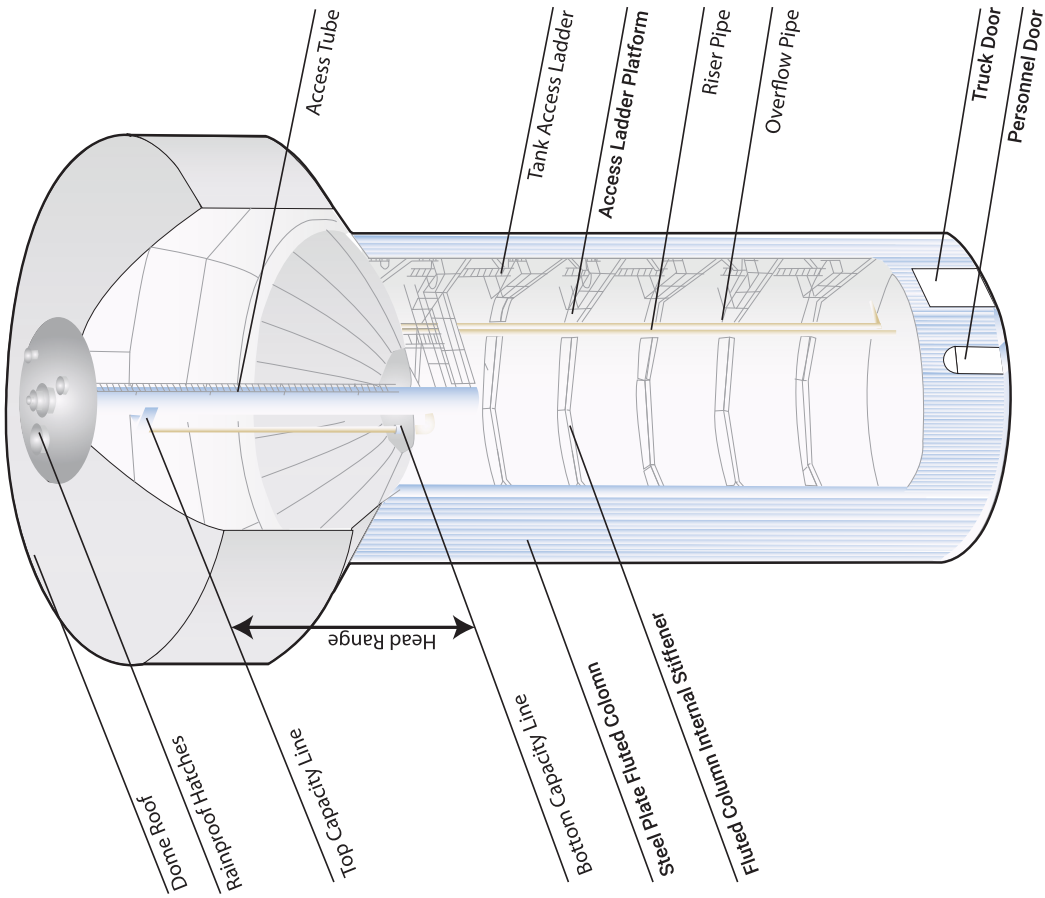
- Improves appearance
- No ponding, minimizes ice and snow accumulation
- Reduces corrosion and streaking on side of tank

### Standard features and options

- One 36 in. wide by 80 in. high steel personnel door with flush threshold
- Concrete floor inside base
- Offset steel riser pipe
- Steel overflow pipe to grade with splash block
- Support structure vents
- Offset ladders inside support structure, with rest platforms at 24 ft maximum intervals
- Safety devices on ladders as required by state and federal regulations
- Walkway with handrails from top of support structure to access tube
- Erection rods under tank bottom for construction and maintenance scaffolding
- One 48 in. diameter access tube
- Ladder in access tube
- Painter's rings at top of support structure
- One 24 in. diameter painter's ring hatch
- One 30 in. tank bottom manway with access ladder to walkway
- Two 30 in. diameter roof hatches
- Minimum 1/4" thick steel roof plates
- Seal welding underside of roof
- Fail-safe roof vent
- Painter's lugs or coupling near tank center inside bottom and roof
- Interior lighting in support structure and access tube

### Options

- Lettering, logos and decorative graphics
- Alternative styles as waterspheroid tank or composite elevated tank
- Dual compartment water storage
- FreshMix™ circulation system
- Structural framing, multiple floors and ceilings inside the support structure
- Additional openings in support structure (e.g. windows)
- Double personnel door
- Overhead doors
- Valve vault inside base
- Control room in support structure
- Dual risers
- Stainless steel riser
- Stainless steel overflow
- Riser insulation and heat tracing
- Alternative ladder arrangements inside support structure
- Fabric or steel condensate ceiling with drain
- Closure plates between flutes and stiffener plates
- Upsized 60 in. diameter or 72 in. diameter access tube
- Tank drain
- Internal tank ladder on access tube
- Roof handrail
- External security or decorative lighting
- FAA lighting
- Instrumentation
- Telemetry
- Cathodic protection
- Lightning protection
- Antenna penetrations and supports

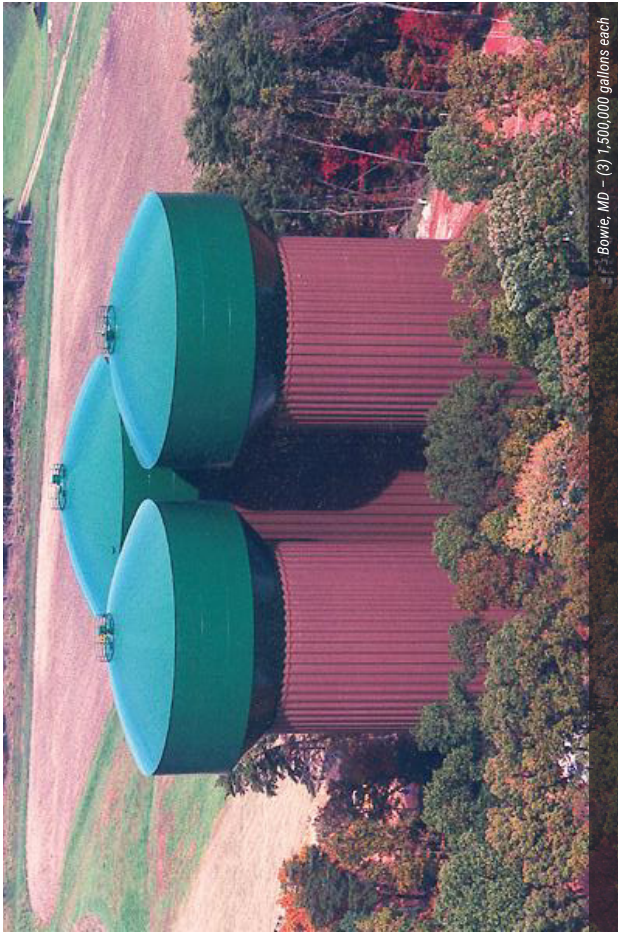


### Standard capacities and dimensions

Capacity U.S. Gallons	Tank Diameter ft.-in.	Head Range* ft.-in.	Fluted Column Diameter ft.-in.
200,000	42 - 0	25 - 0	24 - 0
250,000	42 - 0	30 - 0	24 - 0
300,000	47 - 0	30 - 0	24 - 0
400,000	50 - 0	30 - 0	24 - 0
500,000	57 - 0	32 - 0	30 - 0
500,000	49 - 6	38 - 0	30 - 0
750,000	64 - 0	40 - 0	42 - 0
750,000	62 - 0	40 - 0	36 - 0
1,000,000	74 - 2	40 - 0	52 - 0
1,000,000	74 - 2	40 - 0	44 - 0
1,250,000	80 - 0	40 - 0	52 - 0
1,500,000	86 - 0	40 - 0	60 - 0
1,500,000	90 - 0	40 - 0	52 - 0
2,000,000	100 - 0	40 - 0	78 - 0
2,000,000	100 - 0	40 - 0	66 - 0
2,500,000	108 - 0	44 - 0	78 - 0
3,000,000	120 - 0	42 - 0	90 - 0
3,500,000	125 - 0	45 - 0	90 - 0
4,000,000	135 - 0	45 - 0	90 - 0

\* CB&I Storage Tank Solutions has other head ranges and support structure diameters available for each capacity tank. Please contact us if you need assistance.





Bowie, MD - (3) 1,500,000 gallons each



Ripon, CA - 2,500,000 gallons / ST/SPFA Tank of the Year Award



Aimore, AL - 1,000,000 gallons



Niceville, FL - 500,000 gallons



Shenandoah, TX - 750,000 gallons



Clermont Co., OH - 2,000,000 gallons



Lexington, SC - 1,000,000 gallons



**CB&I**  
**STORAGE**  
**SOLUTIONS**

McDermott's storage business, CB&I Storage Solutions, is the world's leading designer and builder of storage facilities, tanks and terminals. With more than 59,000 structures completed throughout our 130-year history, CB&I Storage Solutions has the global expertise and strategically located operations to provide our customers world-class storage solutions for even the most complex energy infrastructure projects.

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Tel: +1 281 588 6600

**[mcdermott.com](http://mcdermott.com)**



DESIGNING, CONSTRUCTING & MAINTAINING TANKS FOR OVER 120 YEARS.



**CALDWELL**  
Since 1887  
Water - Energy - Industrial

# CALDWELL TANKS – WORKING FOR YOU FROM START TO FINISH

The creation of each water tank goes through a thorough process to ensure quality, safety and customer satisfaction. Caldwell's design team, made up of talented professional engineers, works with each customer to design a water tank that precisely fits their needs. Caldwell has designed every type of tank imaginable – from a ketchup bottle and Mickey Mouse's "Earful Tower" to a simple tank boasting a community name. Whatever the dream is, Caldwell can build it.





Once the vision is in place, Caldwell uses only the best materials in their construction. Caldwell tanks are made from domestic steel and are fabricated at Caldwell facilities using top-of-the-line machinery, ensuring quality output and safe water storage tanks. We are ready and willing to complete the job no matter what the schedule may be. Put Caldwell Tanks to work for you.



**2,500,000 Gallon**  
Bowling Green, Kentucky



# Styles for Every Customer and Community

## Multi-Column

**2,000,000 Gallon Torus Bottom**  
Montgomery County, Ohio  
Steel Tank of the Year 1993 - Steel Plate Fabricators Association



**1,000,000 Gallon Torus Bottom**  
Joliet, Illinois  
Steel Tank of the Year 2001 - Steel Plate Fabricators Association



**500,000 Gallon Torus Bottom**  
Clinton, North Carolina



**500,000 Gallon**  
Taylorsville, Kentucky

## Pedisphere

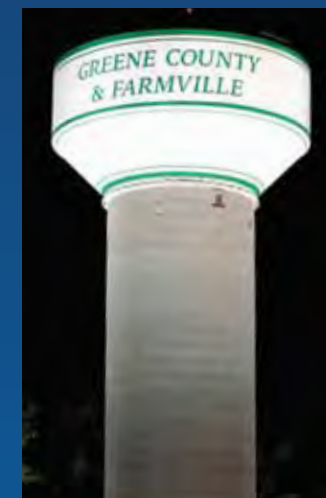
**200,000 Gallon**  
Burke, Wisconsin  
Steel Tank of the Year 1995 - Steel Plate Fabricators Association



**750,000 Gallon**  
Georgetown, Kentucky



**200,000 Gallon**  
Zebulon, North Carolina



**1,000,000 Gallon**  
Farmville, North Carolina

## Fluted



**1,000,000 Gallon**  
McConnell AFB, Wichita, Kansas



**500,000 Gallon**  
Lake Mary, Florida  
Steel Tank of the Year 2002 - Steel Plate Fabricators Association



**1,000,000 Gallon**  
San Antonio, Texas



**1,500,000 Gallon**  
Dothan, Alabama

**3,000,000 Gallon**  
O'Fallon, Missouri  
Steel Tank of the Year 2005 - Steel Tank Institute/Steel Plate Fabricators Association



**2,000,000 Gallon**  
Clermont Co. County, Ohio  
Steel Tank of the Year 2009 - Steel Tank Institute/Steel Plate Fabricators Association

## Ground

**3,000,000 Gallon Reservoir**  
Lexington, Kentucky



**23 Field-Erected Tanks**  
Casselton, North Dakota  
18 Stainless Steel  
5 Carbon Steel



**2,000,000 Gallon**  
Versailles, Kentucky



## Composite Elevated



**2,000,000 Gallon**  
Galveston, Texas



**1,000,000 Gallon**  
San Antonio, Texas



**1,500,000 Gallon**  
Dothan, Alabama

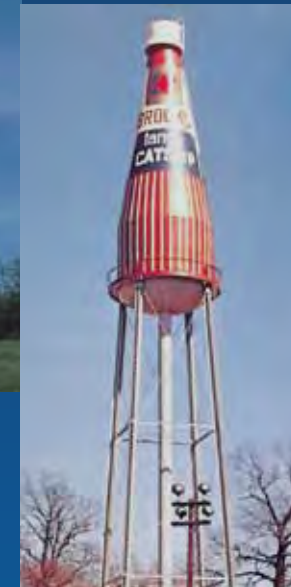
## Specialty



**1,500,000 Gallon Antebellum**  
Newnan, Georgia  
Steel Tank of the Year 1998 - Steel Plate Fabricators Association



**150,000 Gallon Double Ellipsoidal**  
Lake Buena Vista, Florida  
Steel Tank of the Year 1987 - Steel Plate Fabricators Association



**World's Largest Catsup Bottle**  
Collinsville, Illinois



**World's Largest Baseball Bat**  
Louisville, Kentucky



Caldwell is the only tank contractor that offers all types of elevated and ground storage tanks, each holding unique features for a particular purpose. All tanks are constructed in full accordance with the applicable American Water Works Association and American Concrete Institute standards.

## EXCELLENCE IN DESIGN

### MULTI-COLUMN

- Traditional elevated storage
- Most economical and efficient use of steel
- Exterior balcony and ladders
- Unique designs available

### PEDESHERE

- Slender support column and sleek profile
- Minimum steel surface area on exterior
- Base storage for pumps and piping
- Interior ladders and piping systems

### FLUTED COLUMN

- Geometrically well proportioned structure
- Efficient for larger capacity tanks
- Usable storage in pedestal base
- Multiple floors available in base

### COMPOSITE ELEVATED

- Reinforced concrete pedestal support shaft
- No coatings required for pedestal support
- Usable storage in pedestal base
- Multiple floors available in base

### GROUND

- Tank dimensions to meet customer needs
- All roof designs available, either rafter supported or self-supported
- Constructed of carbon steel or stainless steel
- The most economical in terms of cost/gallon to store water

Let Caldwell Tanks' experts help you decide which tank fits your needs for appearance, placement, capacity, schedule and budget!





## 120 YEARS OF DEDICATED EXPERIENCE

Since 1887, Caldwell Tanks has been building innovative, customized water tanks throughout North America. The Caldwell team realizes how important it is to choose a water tank that fits the surrounding environment. That's why we provide expert consultation on the location, shape, size and type of tank we build. Careful consideration is always given to a community's environmental needs and budget. And with Caldwell, customers can choose any style of tank.

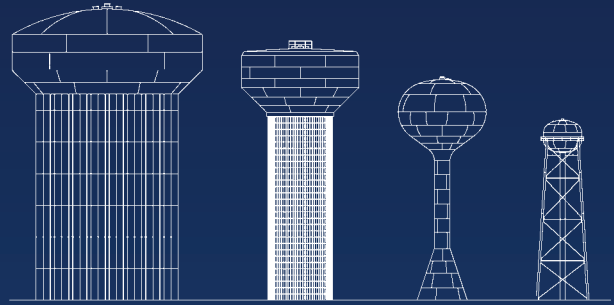
Our in-house professional engineers tailor each tank to meet specific customer requirements. Caldwell controls every phase of

the manufacturing process with our state-of-the-art manufacturing facilities and quality field-erecting teams. We complete the job safely, securely, on-time and within budget, using only the best equipment and proprietary technology to build the perfect water tank for each individual customer.

Caldwell Tanks is the largest privately held water storage tank company in North America, specializing in tanks of all types, shapes and sizes. There is no project too remote or too demanding. Our history and experience shows you can trust Caldwell Tanks.



# CAPACITIES, HEAD RANGES AND TANK DIAMETER



3,000,000  
Gallons

1,000,000  
Gallons

500,000  
Gallons

50,000  
Gallons

## TANK RELATIVE SIZES

### MULTI-COLUMN

Capacity (US Gallons)	Head Range (Feet)	Tank Diameter (Feet)	Columns
50,000	17' 3"	24'	4
75,000	19' 3"	28'	4
100,000	22'	30'	4
125,000	24' 1"	32'	4
150,000	28' 3"	32'	4
200,000	28' 3"	36'	4
250,000	25' 6"	43'	5
300,000	30'	43'	5
400,000	30'	50'	6
500,000	37'	50'	6
500,000	30'	56'	6
600,000	36'	56'	6
750,000	38' 9"	60'	8
750,000	33' 10"	65'	8
1,000,000	38' 9"	70'	8
1,000,000	33'	77'	9
1,500,000	35'	91'	12
2,000,000	34' 9"	105'	14

### COMPOSITE

Capacity (US Gallons)	Head Range (Feet)	Tank Dia. (Feet)	Pedestal Dia. (Feet)
500,000	35'	50'	30'
500,000	30'	58'	30'
750,000	30'	74'	40'
750,000	35'	64'	36'
1,000,000	35'	74'	40'
1,000,000	40'	68'	36'
1,250,000	34'	86'	48'
1,500,000	39' 6"	86'	48'
2,000,000	42'	98'	48'
2,500,000	45'	104'	56'
3,000,000	45'	116'	64'

### PEDESHERE

Capacity (US Gallons)	Shape (Feet)	Head Range (Feet)	Tank Dia. (Feet)
50,000	sphere	21' 3"	24'
75,000	sphere	25' 6"	27'
100,000	sphere	25' 6"	30'
125,000	sphere	29' 6"	32'
150,000	sphere	32' 3"	34'
200,000	spheroid	28' 3"	41'
250,000	spheroid	31'	43' 8"
300,000	spheroid	33'	46' 6"
400,000	spheroid	35' 6"	51' 6"
500,000	spheroid	37' 6"	55' 6"
600,000	spheroid	38' 6"	60'
750,000	spheroid	40'	66'
1,000,000	spheroid	40'	74'
1,250,000	spheroid	40'	80'
1,500,000	spheroid	48'	84'

### FLUTED COLUMN

Capacity (US Gallons)	Head Range (Feet)	Tank Dia. (Feet)	Column Dia. (Feet)
250,000	30'	42'	25'
300,000	32'	44'	25'
400,000	39' 6"	46'	25'
500,000	38'	50'	30'
500,000	30'	58'	34'
750,000	40'	64'	42'
1,000,000	40'	74'	52'
1,000,000	35'	80'	52'
1,500,000	42'	86'	60'
1,500,000	35'	96'	60'
2,000,000	42'	96'	72'
2,500,000	44' 6"	104'	78'
3,000,000	42'	120'	90'

VISIT OUR WEBSITE AT [WWW.CALDWELLTANKS.COM](http://WWW.CALDWELLTANKS.COM)  
TO DOWNLOAD DETAILED PROJECT SPECIFICATIONS  
AND STANDARD DRAWINGS.



From the Louisville, Kentucky, 180,000 square foot manufacturing facility to the 135,000 square foot manufacturing plant in Newnan, Georgia, Caldwell is equipped with advanced computer technology and state-of-the-art fabrication, welding and painting equipment for both carbon and stainless steel.



Headquarters, Manufacturing and Sales Office  
4000 Tower Road, Louisville, Kentucky 40219  
ph: (502) 964-3361 fax: (502) 966-8732

Southern Manufacturing Facility  
57 East Broad Street, Newnan, Georgia 30263  
ph: (770) 253-3232 fax: (770) 251-9253

[www.caldwelltanks.com](http://www.caldwelltanks.com)  
[sales@caldwelltanks.com](mailto:sales@caldwelltanks.com)





Charter Township of  
*Northville*



# **Waterspheroid®**

ELEVATED WATER STORAGE

[mcdermott.com](http://mcdermott.com)

**MCDERMOTT**

**CB&I**  
STORAGE  
SOLUTIONS



Modern sleek design

## Why choose a Waterspheroid® elevated tank?

Proven to be the most popular of all single pedestal elevated water storage tank styles, the Waterspheroid elevated tank is available in storage capacities from 150,000 to 2,000,000 gallons. It offers low capital and maintenance costs, enhanced safety/security, convenient storage, and a small footprint that minimizes land requirements.

With its sleek design and pleasing contours the Waterspheroid tank is well suited for high visibility locations such as school grounds, commercial developments, residential neighborhoods, parks and other prominent locations.

We invented the Waterspheroid tank design, and we have built more single pedestal steel spheroidal elevated tanks than any other company, including the tallest and largest capacity tanks in service. We have the most experience in the industry in the art of forming the ball. We use larger steel plates than our competitors which leads to a smoother ball shape with fewer weld seams, minimizes potential areas of paint failure and reduces long-term paint maintenance of the tank.

Additionally, we use double-curved, hot pressed knuckles between the bell and the shaft and between the shaft and the ball. Not only does this add to the smooth line aesthetics of the tank, it eliminates the potential lamellar tearing that could occur on tanks using dollar plates and coned sections in these areas.

Waterspheroid tanks are all-steel, all-welded structures that have proven reliability, serving thousands of municipalities and industries for decades. Properly maintained and operated, steel tanks offer an extremely long life, with some structures exceeding 100 years of service.

Since the construction of our first elevated tank in 1894, we have become a global leader in the design and construction of elevated water storage tanks. We pioneered the transition to welded steel tanks in the 1930s, invented the original Watersphere® tank in 1939, the larger Waterspheroid® tank in 1954, and have been improving the concept ever since. We also have been instrumental in the development of the AWWA standards, beginning with the first D100 Standard in 1941, continuing today through active organization and committee participation.

## Taking the Lead with QHSES

McDermott is committed to setting a leading example in all areas of Quality, Health, Safety, Environment and Security, and encourages our partners, subcontractors and clients to join us in the pursuit of outstanding QHSES performance. Taking the Lead is a company-wide initiative that brings a single, united QHSES culture to our diverse workforce and organization, a culture where setting the right example in QHSES attitude and behavior is simply 'in our DNA.'



Optional roof mounted antennae



Unhindered maintenance access

Piping and valves in base



More pleasing appearance, lower maintenance and superior security than multi-column tanks

## Selecting a Waterspheroid® elevated tank

CB&I Storage Solutions provides sample specifications and detail drawings for engineers and owners who are planning Waterspheroid projects. Contact our regional sales force to receive guidance on specifying your tank or visit [www.mcdermott.com/water](http://www.mcdermott.com/water) to view our standard specifications and drawings.

### Maintenance

- Style minimizes interior and exterior painted surface area and future maintenance
- Interior dry surfaces are weather protected and seldom need repainting
- Maintenance access to all exterior surfaces is unhindered

### Safety and security

- Solid, flush threshold steel door with deadbolt lock restricts unauthorized entry
- Enclosed interior access ladders
  - Minimize vandalism and unsightly graffiti
  - Minimize unauthorized tank access
- Facilitate climbing during inclement weather
- Proven performance in high wind events (tornadoes and hurricanes)

### Multi-purpose space inside bell

- Optionally insulated and heated
- Provides space for multiple uses, such as:
  - Tool and equipment storage
  - Pumps, valves, piping and controls
  - Telecommunication equipment
- Flush threshold personnel door allows easy access for storage

### Aesthetic design

- Smooth contours
  - The most popular single pedestal style in use
  - Visually pleasing, modern design
- Blends well with surroundings
- Capitalizes on high visibility locations
  - Optional lettering and logos enhance community identity and pride
  - Custom ornamental and specialty paint designs available

### Economics

- Low capital expenditure
- All-steel composition permits cost effective, year-round construction
- Small footprint permits "tight sites" and minimizes land cost
- Turnkey supply of foundation and painting offers cost and schedule savings
- Eliminates costly and unsightly fencing
- Height can be modified if pressure requirements change after installation
- At end of life cycle, tank can be demolished at minimal cost



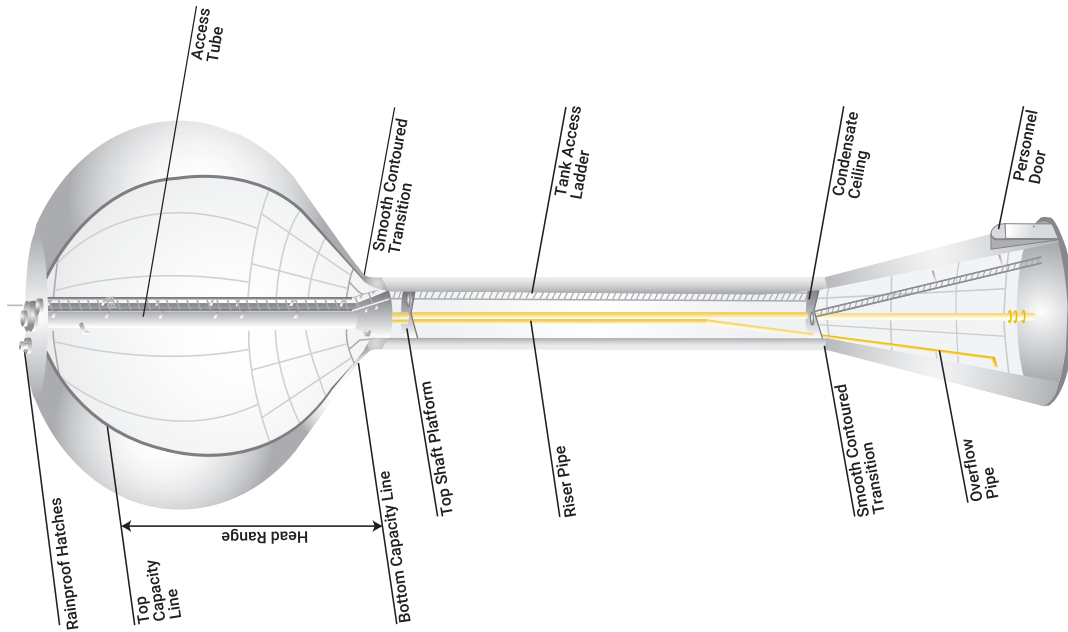
Visually pleasing contours blend well with surroundings



Attractive graphics enhance community identity



## Standard features and options



### Standard features

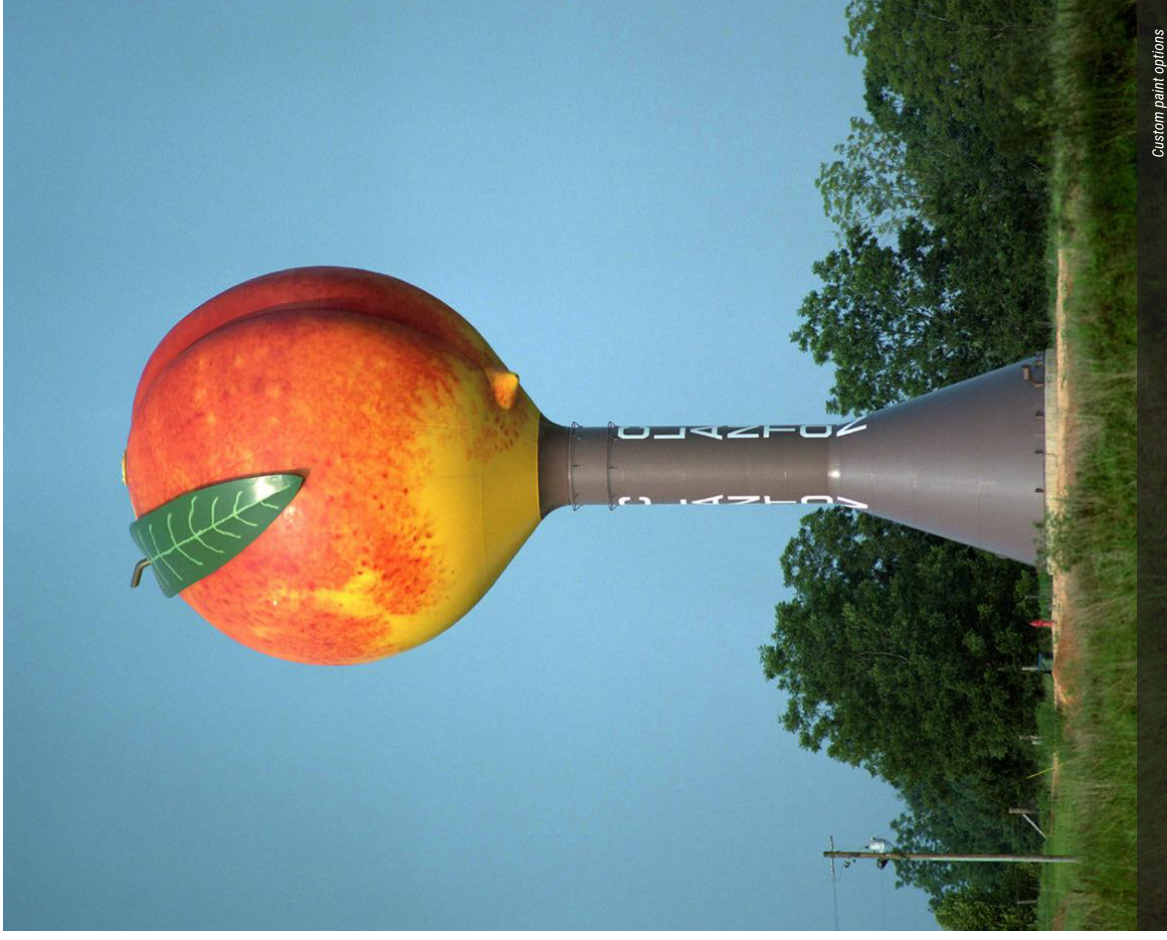
- One 36 in. wide by 80 in. high steel personnel door with flush threshold
- Concrete floor inside base
- Steel riser pipe with expansion joint
- Steel overflow pipe to grade with splash block
- Steel condensate ceiling with drain
- Ladders in pedestal and access tube
- Safety devices on ladders as required by state and federal regulations
- Steel top shaft platform with one 30 in. diameter manway in top shaft platform
- One 30 in. diameter manway in condensate ceiling
- One 42 in. diameter access tube
- Painter's rings at top of pedestal
- One 24 in. diameter painter's ring hatch
- Two 30 in. diameter roof hatches
- One 24 in. diameter painter's ventilation roof hatch
- Seal welding underside of roof plates
- Minimum 1/4" thick steel roof plates
- Fail-safe roof vent
- Interior lighting in pedestal and access tube

### Options

- Lettering, logos and decorative graphics or Hydropillar®
- Alternative style as composite elevated tank
- Ornamental and specialty styling
- FreshMix™ circulation system
- Double personnel door
- Overhead door
- Valve vault inside base
- Control room in base
- Dual risers
- Stainless steel riser
- Stainless steel overflow
- Riser insulation and heat tracing
- Intermediate platforms
- Seal welding of pedestal appurtenances
- Upsized 48 in. diameter or 60 in. diameter access tube
- Tank drain
- Internal tank ladder on access tube
- Roof handrail
- External security or decorative lighting
- FAA lighting
- Instrumentation
- Telemetry
- Cathodic protection
- Lightning protection
- Antenna penetrations and supports

## Standard capacities and dimensions

Capacity U.S. Gallons	Spheroid Diameter ft.-in.	Head Range ft.-in.
150,000	35 - 0	30 - 0
200,000	39 - 10	30 - 0
250,000	42 - 10	32 - 6
300,000	46 - 6	32 - 6
400,000	50 - 8	37 - 6
500,000	55 - 10	37 - 6
600,000	58 - 2	40 - 0
750,000	64 - 8	40 - 0
1,000,000	74 - 8	40 - 0
1,250,000	79 - 2	45 - 0
1,500,000	86 - 0	46 - 0
2,000,000	93 - 0	52 - 0



Custom paint options





**CB&I**  
**STORAGE**  
**SOLUTIONS**

McDermott's storage business, CB&I Storage Solutions, is the world's leading designer and builder of storage facilities, tanks and terminals. With more than 59,000 structures completed throughout our 130-year history, CB&I Storage Solutions has the global expertise and strategically located operations to provide our customers world-class storage solutions for even the most complex energy infrastructure projects.

## **Corporate Office**

915 N. Eldridge Parkway  
Houston, TX 77079  
Tel: +1 281 588 6600

**[mcdermott.com](http://mcdermott.com)**

# **CAPITAL, O&M, AND LIFE CYCLE COSTS**



**SUMMARY OF  
VENDOR COST**

Vendor	Tank Height (ft)	Tank Style				Notes
		Multi-Legged	Composite	Hydropillar/Fluted	Spheroid/Pedesphere	
Caldwell Tanks	160					<u>Multi-Column:</u> Dia. = 91.0', operating head = 35.0' <u>Composite:</u> Dia. = 86.0', operating head = 39.5' <u>Fluted:</u> Dia. = 86.0', operating head = 42.0' <u>Pedepshere:</u> Dia. = 84.0', operating head = 48.0' If non-shallow foundation with rock excavation, likely an additional \$250,000 - \$500,000.
	200	\$4,650,000	\$3,850,000	\$4,550,000	\$4,750,000	
Landmark	160	\$3,092,000	\$3,183,000	\$3,892,000	\$3,806,000	
	210	\$3,331,000	\$3,429,000	\$4,146,000	\$4,031,000	
Phoenix	160	\$3,600,000	\$3,600,000	-	-	Budget is based on good site conditions with minimum 150'x150' flat staging area & good access to site.
	220	\$3,950,000	\$3,950,000	-	-	
McDermott	150	-	\$3,408,000	\$3,453,000	\$3,184,000	Assumed a height of 150' from top of grade to overflow (TCL). Each tank will have a 45' headrange. <b>If deep pile foundations are required, it may add +/- \$150,000 or more to the cost, depending on the type, quantity and depth of the piles.</b> A typical tank site area is 200' x 200' area to safely accommodate crane, laydown area, and equipment. <b>Shrouding could add +/- \$120,000 or more to the budget estimates.</b>
	160	-	\$3,457,000	\$3,697,000	\$3,378,000	
	200	-	\$3,684,000	\$4,219,000	\$3,773,000	
	220	-	\$3,783,000	\$4,473,000	\$3,965,000	

## David Bennett

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**From:** Wilkins, Scott <scott.wilkins@suez.com>  
**Sent:** Monday, November 09, 2020 9:21 AM  
**To:** David Bennett; Genevieve Versteeg  
**Subject:** New 1.5 MG Tank in Apex

David/Genevieve- Please see **budget** MP numbers for various new tank designs. Once we have CD's we can out an exact cost for the various tanks. Please don't hesitate to call me if you have any further questions. Thanks Scotty

Elevated - \$50,000  
Pedsphere---\$27,893  
Composite-\$32,890  
Hydropillar-\$39,402

**Scotty Wilkins**  
Water System Consultant  
**Water | Advanced Solutions**

Mob. : (336) 210-9251  
Fax. :(336) 643-4079



**Utility Service Co., Inc.**  
200 Old Covered Bridge Rd  
Madison, NC 27358  
scott.wilkins@suez.com

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**From:** David Bennett <dbennett@thewootencompany.com>  
**Sent:** Monday, November 9, 2020 8:37 AM  
**To:** Wilkins, Scott <scott.wilkins@suez.com>  
**Subject:** RE: New 1.5 MG Tank in Apex

Scott-

We did not receive your cost estimates for Apex's elevated water tank options. I want to verify that you did not send it or check why I did not receive it. Can you please let me know the status?

Thanks

**David Bennett, P.E.**  
Project Manager  
The Wooten Company  
120 North Boylan Avenue  
Raleigh, NC 27603 [MAP](#)



p.919.828.0531 x873  
f.919.834.3589  
[www.thewootencompany.com](http://www.thewootencompany.com)



THE WOOTEN COMPANY

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**From:** Wilkins, Scott [<mailto:scott.wilkins@suez.com>]  
**Sent:** Friday, October 09, 2020 3:07 PM  
**To:** Genevieve Versteeg  
**Cc:** David Bennett  
**Subject:** RE: New 1.5 MG Tank in Apex



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**From:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Sent:** Friday, October 9, 2020 3:06 PM  
**To:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Cc:** David Bennett <[dbennett@thewootencompany.com](mailto:dbennett@thewootencompany.com)>  
**Subject:** RE: New 1.5 MG Tank in Apex

Great!  
Thanks!

---

**From:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Sent:** Friday, October 9, 2020 2:53 PM  
**To:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Subject:** RE: New 1.5 MG Tank in Apex

OK😊

---

**From:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Sent:** Friday, October 9, 2020 2:42 PM  
**To:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Subject:** RE: New 1.5 MG Tank in Apex

Hello, again!

I've recently been informed that there is a possibility that the height for the 1.5-MG tank in the City of Apex will be 160 ft.

So, when you are running your annual O&M costs, can you change the height from 220 ft to 160 ft?

Thank you!

---

**From:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Sent:** Friday, October 9, 2020 12:25 PM  
**To:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Subject:** RE: New 1.5 MG Tank in Apex

Will do😊

---

**From:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Sent:** Friday, October 9, 2020 11:53 AM  
**To:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Subject:** RE: New 1.5 MG Tank in Apex

I'm unsure.

We have not started design of the tanks yet, not until the Town has decided on a style.

If you need this information for the cost estimate, please assume this tank will be similar to the Tingen tank. I believe the Tingen Tank has 12 legs. Not sure about the diameter.

Sorry.

---

**From:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Sent:** Friday, October 9, 2020 11:45 AM  
**To:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Subject:** RE: New 1.5 MG Tank in Apex

Genevieve- How many legs will be on the multi-leg tank and what will be their diameter? Thanks Scotty

---

**From:** Genevieve Versteeg <[gversteeg@thewootencompany.com](mailto:gversteeg@thewootencompany.com)>  
**Sent:** Friday, October 9, 2020 10:43 AM  
**To:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Subject:** FW: New 1.5 MG Tank in Apex

---

**From:** Genevieve Versteeg  
**Sent:** Wednesday, October 7, 2020 1:46 PM  
**To:** Wilkins, Scott <[scott.wilkins@suez.com](mailto:scott.wilkins@suez.com)>  
**Subject:** New 1.5 MG Tank in Apex

Hello, Mr. Wilkins.

I previously informed you that the Town of Apex has contracted The Wooten Company in the siting and design of a new 1,500,000-gallon elevated storage tank.

Here is the Tank details:

Capacity = 1.5 million gallons

Height = 200 – 220 ft

Overflow Elevation = 616.8 ft

We have 3 potential locations for the tank (see attached).

All sites have an approximate elevation of 400 ft.

The style of the tank will either be multi-leg, composite, hydropillar, or spheroid.

As part of the design of the tank, I need an estimate of the annual maintenance costs for these different styles of tank.



I have a copy of Apex's contract with the Utility Service Co. for the maintenance of their 1.5-MG Tingen tank, so I have the annual maintenance costs for a multi-leg tank.

Please provide a Projected Schedule of Work and Fees for the following styles of tanks:

- 1.5-MG Composite Tank
- 1.5-MG Hydropillar (or Fluted column)
- 1.5-MG Spheroid (or Pedesphere)

Please let me know if the Utility Service Company does not perform maintenance of these styles of tanks.

Any information you can give me would be of great help. You may email me back or call me at (919) 828-0531 ext. 882.

Thank you for your time.

Regards,

**Genevieve B. Versteeg**

Assistant to the Project Engineer

The Wooten Company

120 North Boylan Avenue

Raleigh, NC 27603 [MAP](#)

p.919.828.0531 x.882

f.919.834.3589

[www.thewootencompany.com](http://www.thewootencompany.com)

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### Life Cycle Cost Analysis

	Life Cycle Cost Design Period = 20 years			
	COR Rate = 4.0%			
	Multi-Leg	Composite	Hydropillar	Spheroid
Construction Cost <sup>1</sup>	\$3,977,000	\$3,739,200	\$4,347,000	\$4,129,750
Annual O&M <sup>2</sup>	\$50,000	\$32,890	\$39,402	\$27,893
Present Worth (PW) (P/A, 4.0%, 20)	\$794,000	\$523,000	\$626,000	\$443,000
<b>Total Present Worth</b>	<b>\$4,024,000</b>	<b>\$3,559,200</b>	<b>\$4,156,000</b>	<b>\$3,796,750</b>

Notes:

1. Construction cost provided by vendor and include shallow foundation system, tank fabrication/erection, shop primed, and field painted for a 1,500,000-gallon tank at 155-ft.
2. Annual O&M costs were developed based on actual yearly maintenance costs from Town's existing O&M contractor, Utility Service Co, Inc.



Site #	Site Description	Town Owned?	Project Constraints	Variance from Town Specs	FAA Requirements	Construction Considerations	Estimated Land Acquisition Cost	Other Notes
1A	Peakway connection, south side of S. Salem	No	Neighborhood Impacts, Road Project	Likely None	None	Likely None	Unknown	Peakway project timeline could impact tank operation
1B	Peakway Loop	No	Neighborhood Impacts, Road Project	Likely None	None	Likely None	Unknown	Peakway project timeline could impact tank operation
2	S. Salem and Apex BBQ	No	Depot 499 Construction	Likely None	None	Likely None	\$3.0-\$3.5 M	Limit non-residential development on parcel
3A	Depot 499/WCPSS East	No	Depot 499 and WCPSS Construction	Likely None	None	Likely None	Unknown	Site plan may be limited for accomodating tank
3B	Depot 499/WCPSS West	No	Depot 499 and WCPSS Construction	Likely None	None	Likely None	Unknown	Site plan may be limited for accomodating tank
4	Pleasant Park	Yes	Pleasant Park Construction; tank over 200' tall	Tank Height would require UDO Amendment. Potentially would require revised Pleasant Park Site Plan	TBD (May require checkerboard paint scheme and/or lighting)	Tank construction will start after phase 1 of the park is complete. Minimal impacts to completed portion of park.	\$0	Tank location better for future growth & redundancy
5	Hunter St - FD#3	Yes	Nearby residences, Future Affordable Housing Site, Future FD Admin Bldg	Likely None	None	Coordination with FD during construction period	\$0	

#1 Rank
#2 Rank
#3 Rank
All Others

# | Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: WORK SESSION

Meeting Date: July 19, 2022

## Item Details

Presenter(s): Michael Deaton, Water Resources Director

Department(s): Water Resources

### Requested Action

- A. Receive update on the Town's Big Branch Pump Station and Force Main Design Project
- B. Possible motion to approve route for force main alignment just outside US-1 Right-of-Way.

### Approval Recommended?

Yes

### Item Details

Utilizing the NCDOT right-of way (R/W) has always been the Town's preference for the force main alignment to serve Big Branch 2 pump station. Due to NCDOT not allowing the force main to be installed within the US 1 controlled access R/W, the force main will need to be installed in public utility easements. Alternative routes are available but will impact private properties. Although initial conversations have been fairly positive, there will undoubtedly be property owners that are unwilling to negotiate with the Town for a utility easement across their property. Staff is asking for support of a force main alignment just outside the US-1 R/W so the Town's consultant (Hazen) can continue their design and keep the project on schedule.

### Attachments

- Map of force main alignments
- Easement Summary

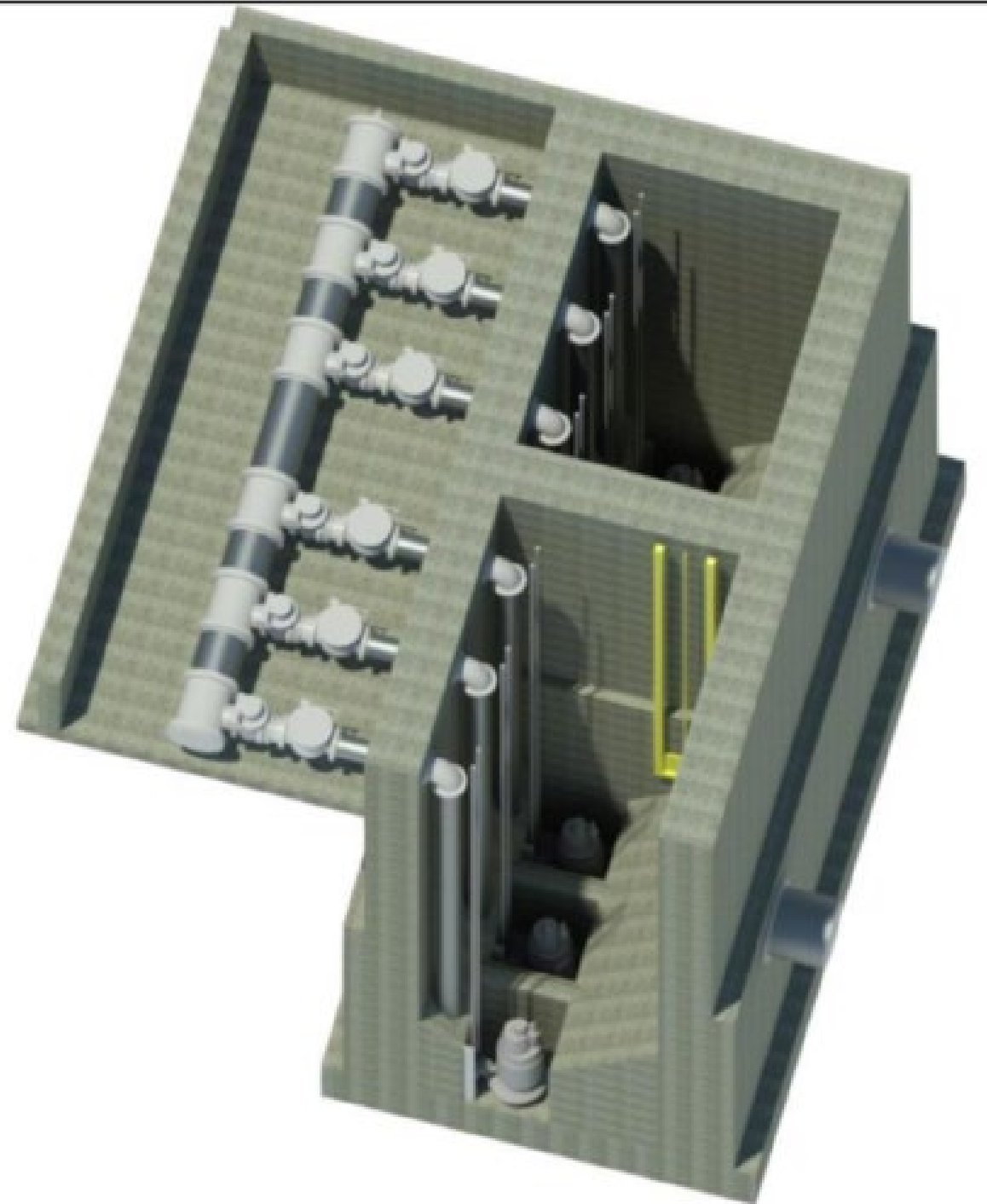




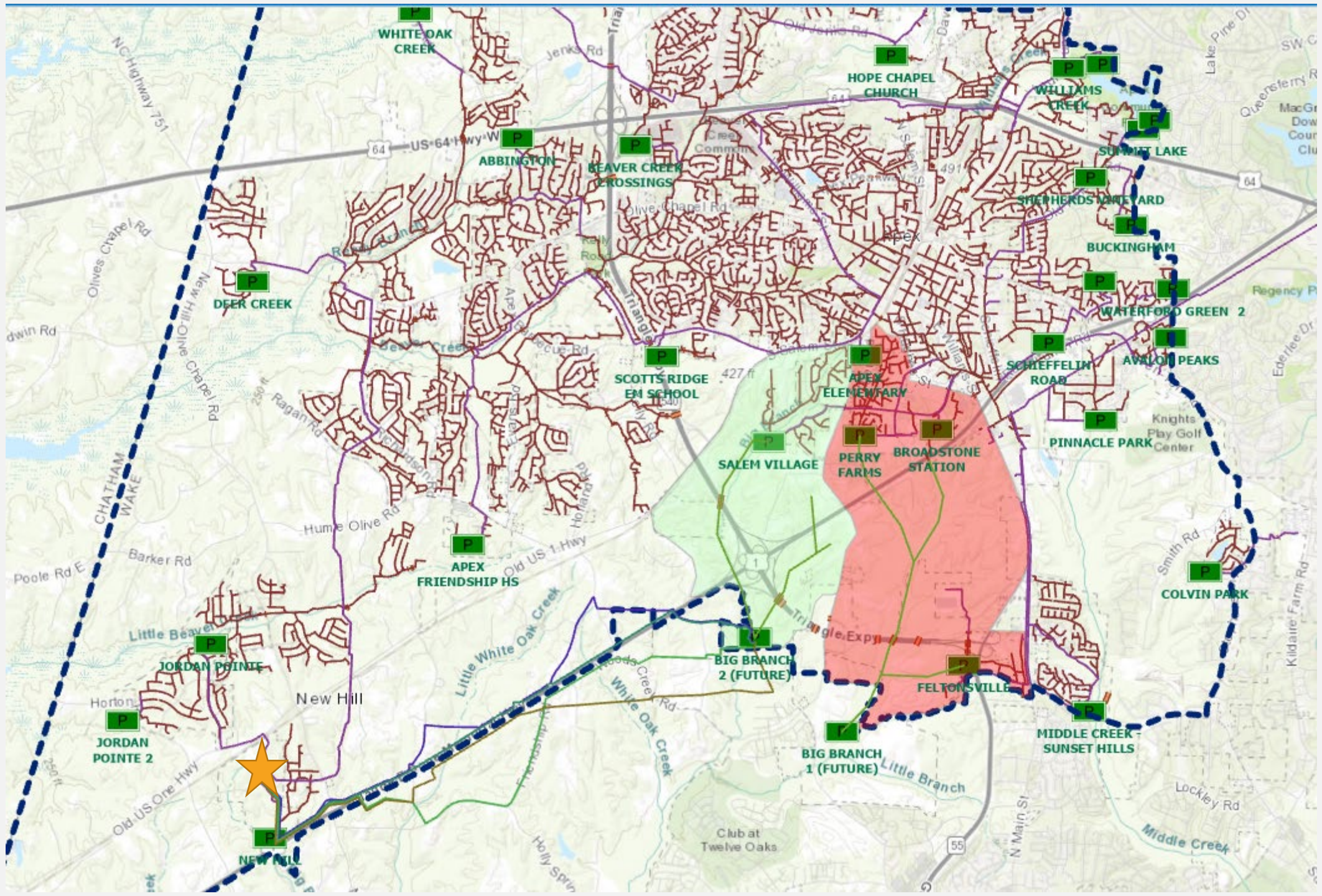
**BIG BRANCH 2 PUMP STATION  
AND FORCE MAIN**

## PROJECT BACKGROUND

- 4.3 MGD capacity pump station
- Dual 20-inch force mains from pump station site to WWRWRF (~5 miles)
- Cost Estimate: \$25-30M (excl. land/easement acquisition)



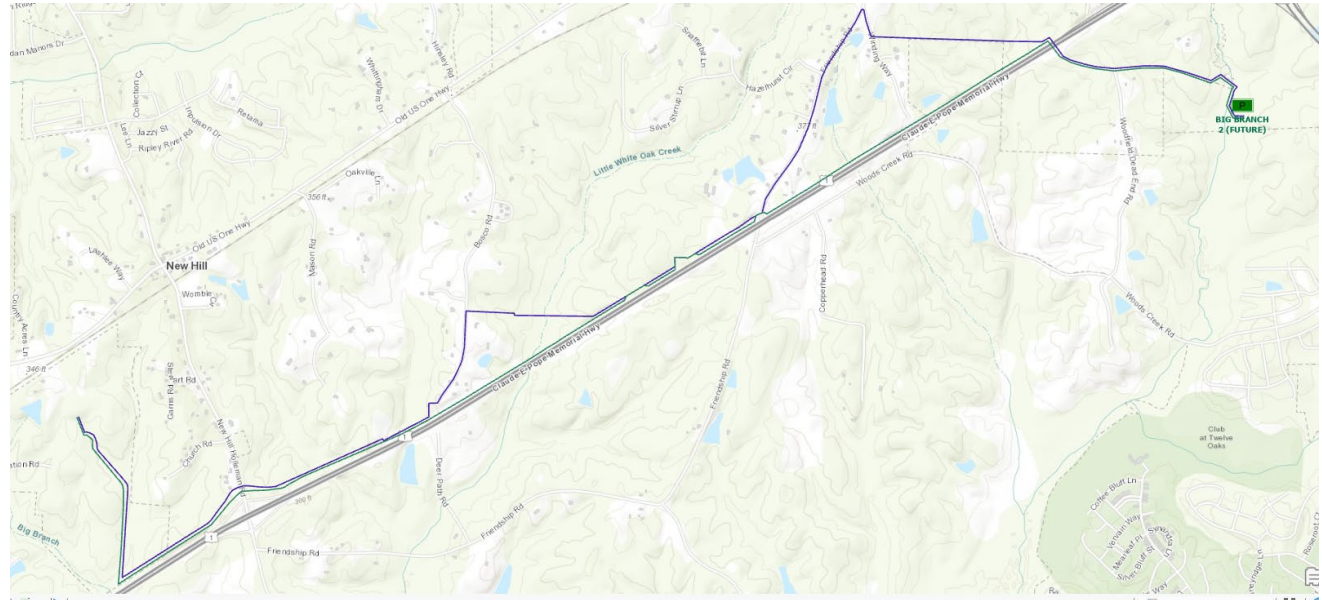






# FORCE MAIN ROUTING OBJECTIVES

- A to B
- Shortest distance (~straight line)
- Minimize environmental impacts
- Minimize private property impacts
- Minimize costs





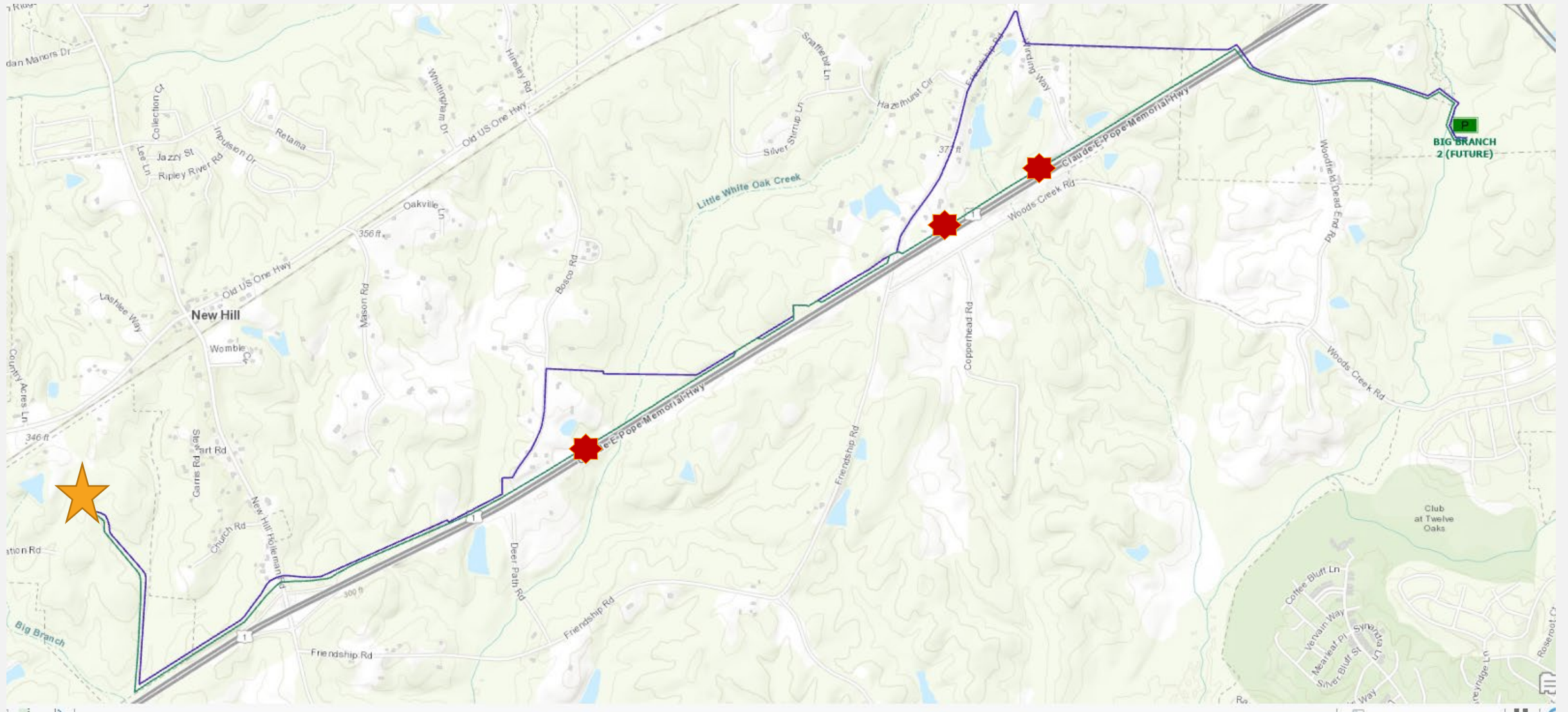




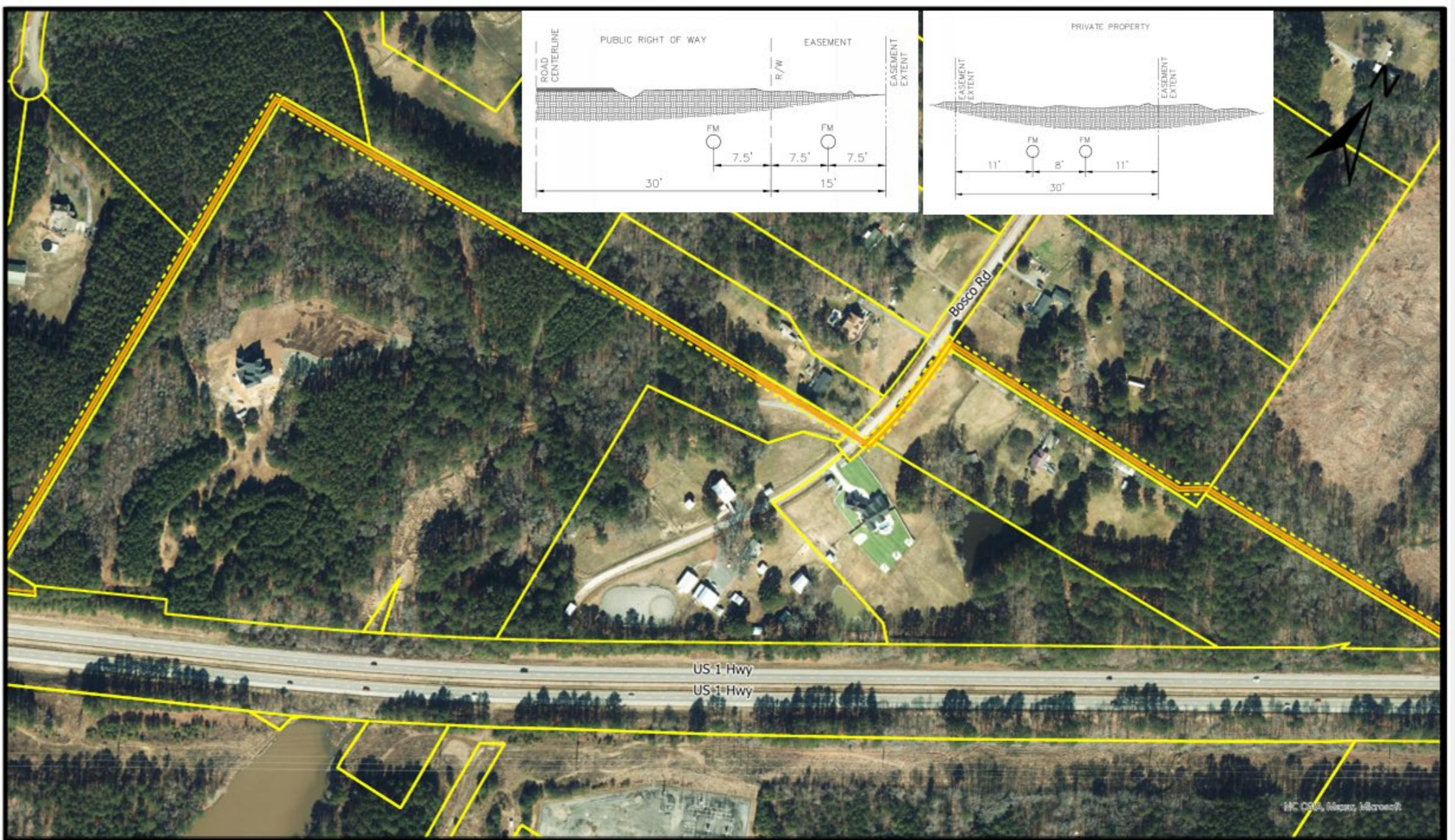


# NCDOT CORRESPONDENCE TIMELINE

- September 2021 – Virtual meeting with NCDOT staff. Presented ROW encroachment feasibility assessment, which included evidence that sufficient space exists, even if a future lane is added
- October 2021 – Formal variance request submitted to NCDOT State Encroachments Engineer
- November 2021 – Request denied by NCDOT State Encroachments Engineer
- March 2022 – Variance denial appealed to NCDOT Division Engineer
- April 2022 – NCDOT Division Engineer denied appeal via email
- April 2022-Present – Informal conversations internally and with affected property owners indicate support for further escalation of appeal to NCDOT’s decision. Field investigations performed to refine alternative alignments around major obstructions







MC 010, March, 2007

0 425 850 1,700 US Feet

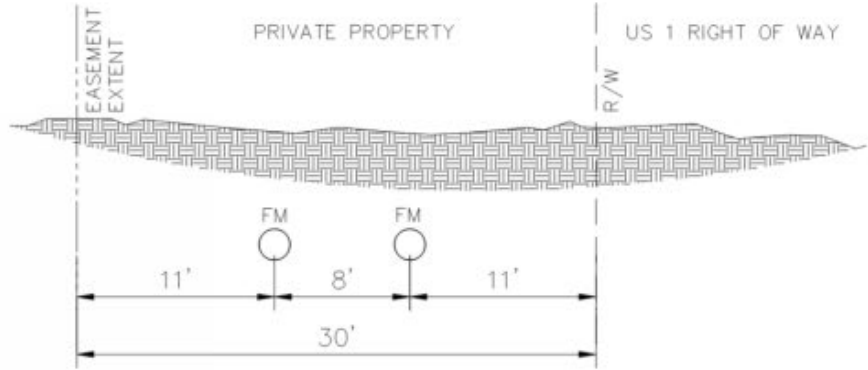
**Bosco Road Routing**  
Option 4

**Big Branch Force Main Routings**  
Town of Apex





OPTION 3



Bosco Road Routing  
Option 3

Big Branch Force Main Routings  
Town of Apex

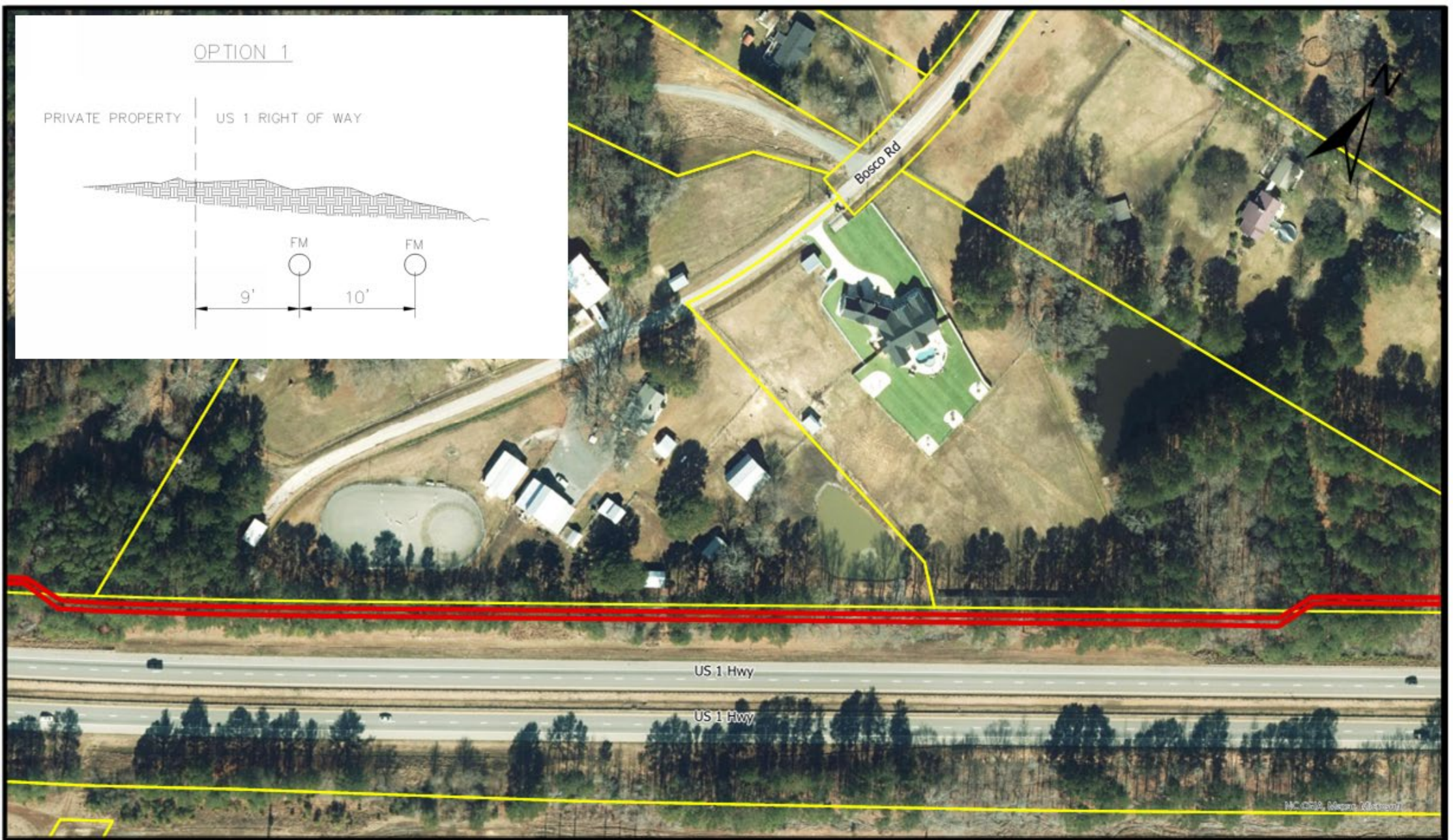
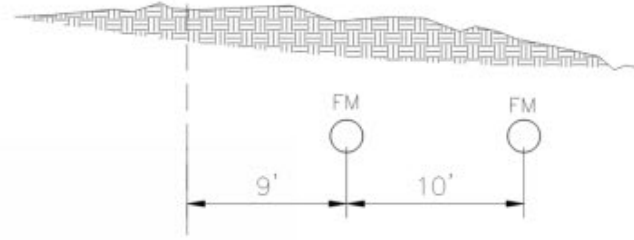




OPTION 1

PRIVATE PROPERTY

US 1 RIGHT OF WAY



MC DEW, March 2019



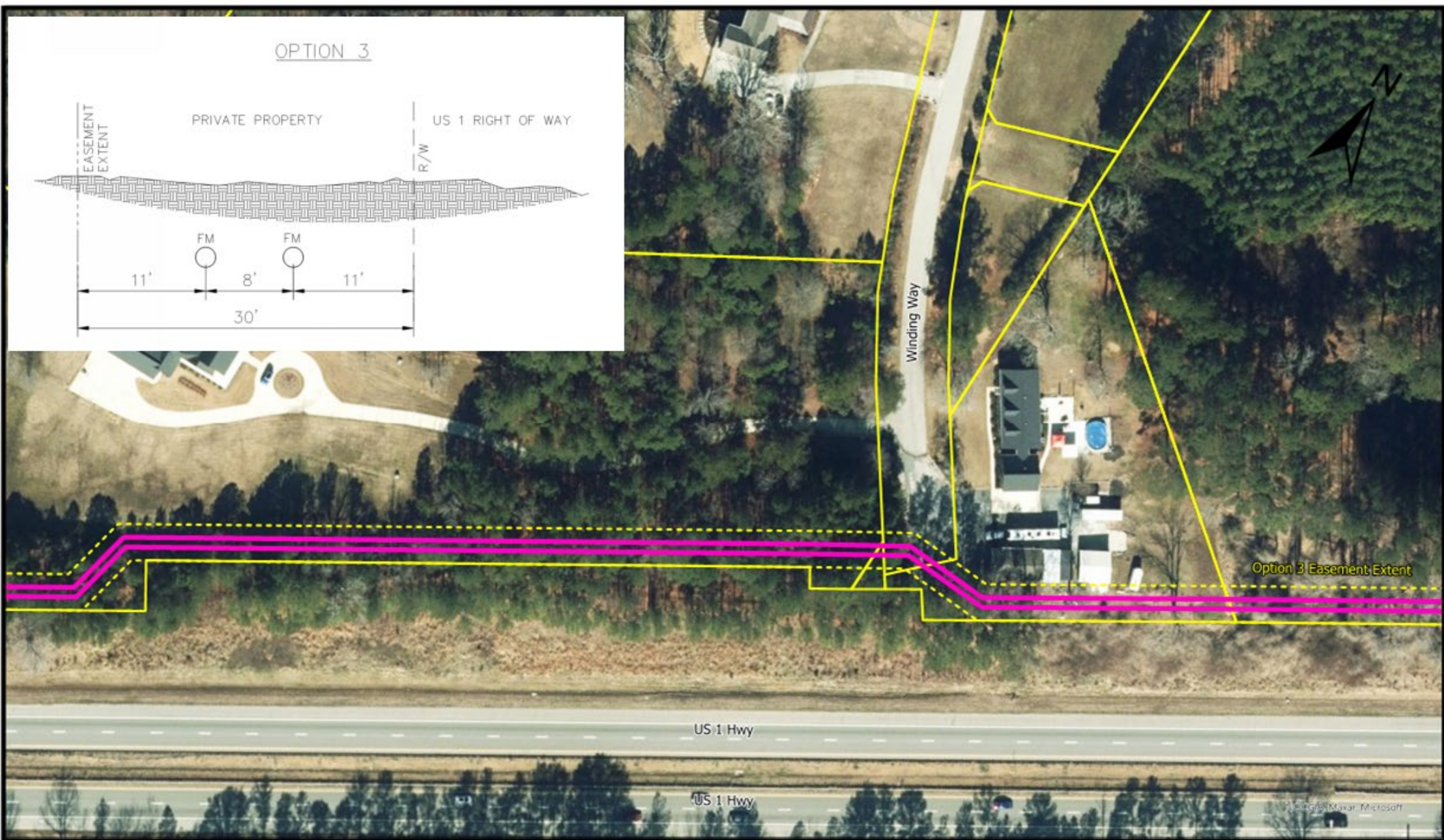
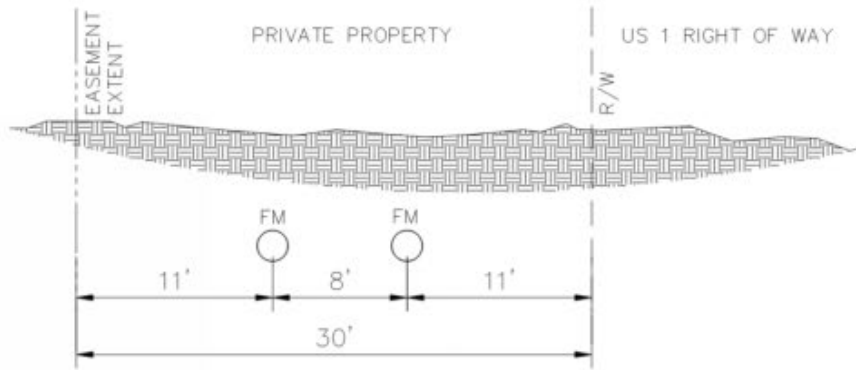
Bosco Road Routing  
Option 1

Big Branch Force Main Routings  
Town of Apex






OPTION 3



Option 3 Easement Extent



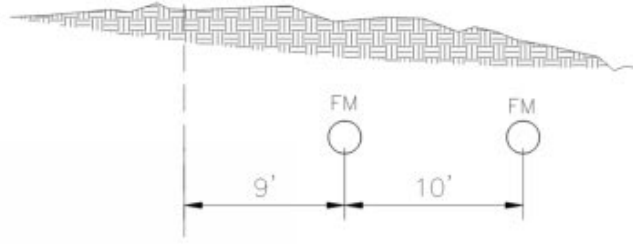
Winding Way Routing Option 3	Big Branch Force Main Routings Town of Apex	
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OPTION 1

PRIVATE PROPERTY

US 1 RIGHT OF WAY



Winding Way

US 1 Hwy

US 1 Hwy

© 2010 Maxar, Microsoft



Winding Way Routing

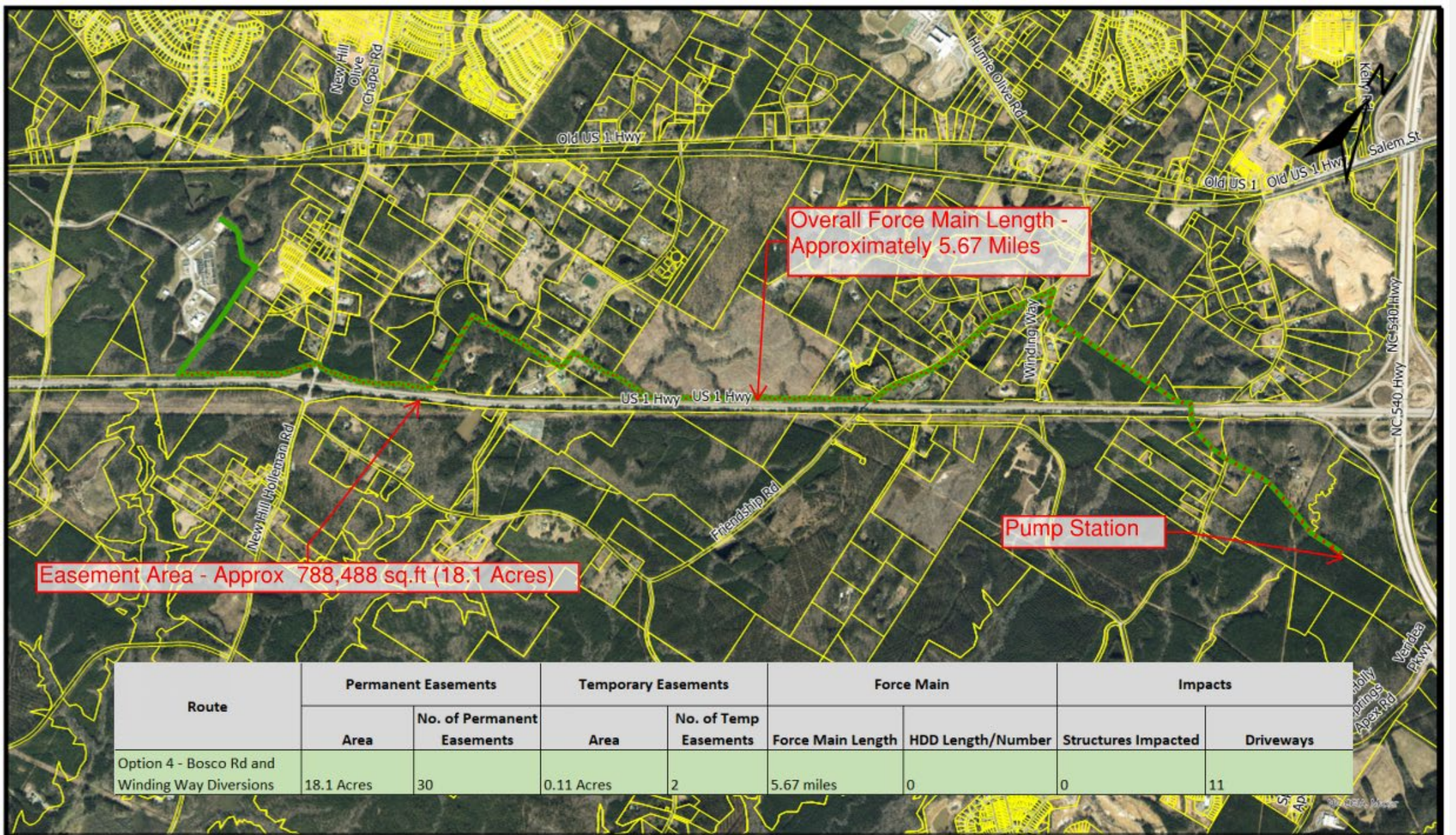
Option 1

Big Branch Force Main Routings

Town of Apex







Easement Area - Approx 788,488 sq.ft (18.1 Acres)

Overall Force Main Length - Approximately 5.67 Miles

Pump Station

Route	Permanent Easements		Temporary Easements		Force Main		Impacts	
	Area	No. of Permanent Easements	Area	No. of Temp Easements	Force Main Length	HDD Length/Number	Structures Impacted	Driveways
Option 4 - Bosco Rd and Winding Way Diversions	18.1 Acres	30	0.11 Acres	2	5.67 miles	0	0	11



Option 4  
30FT Easement

Big Branch Force Main Routings  
Town of Apex







Route	Permanent Easements		Temporary Easements		Force Main		Impacts	
	Area	No. of Permanent Easements	Area	No. of Temp Easements	Force Main Length	HDD Length/Number	Structures Impacted	Driveways
Option 3 - US 1 Highway	14.6 Acres	20	0.23 Acres	4	5.08 miles	2053 ft / 2	1	0

Option 3  
30FT Easement

Big Branch Force Main Routings  
Town of Apex



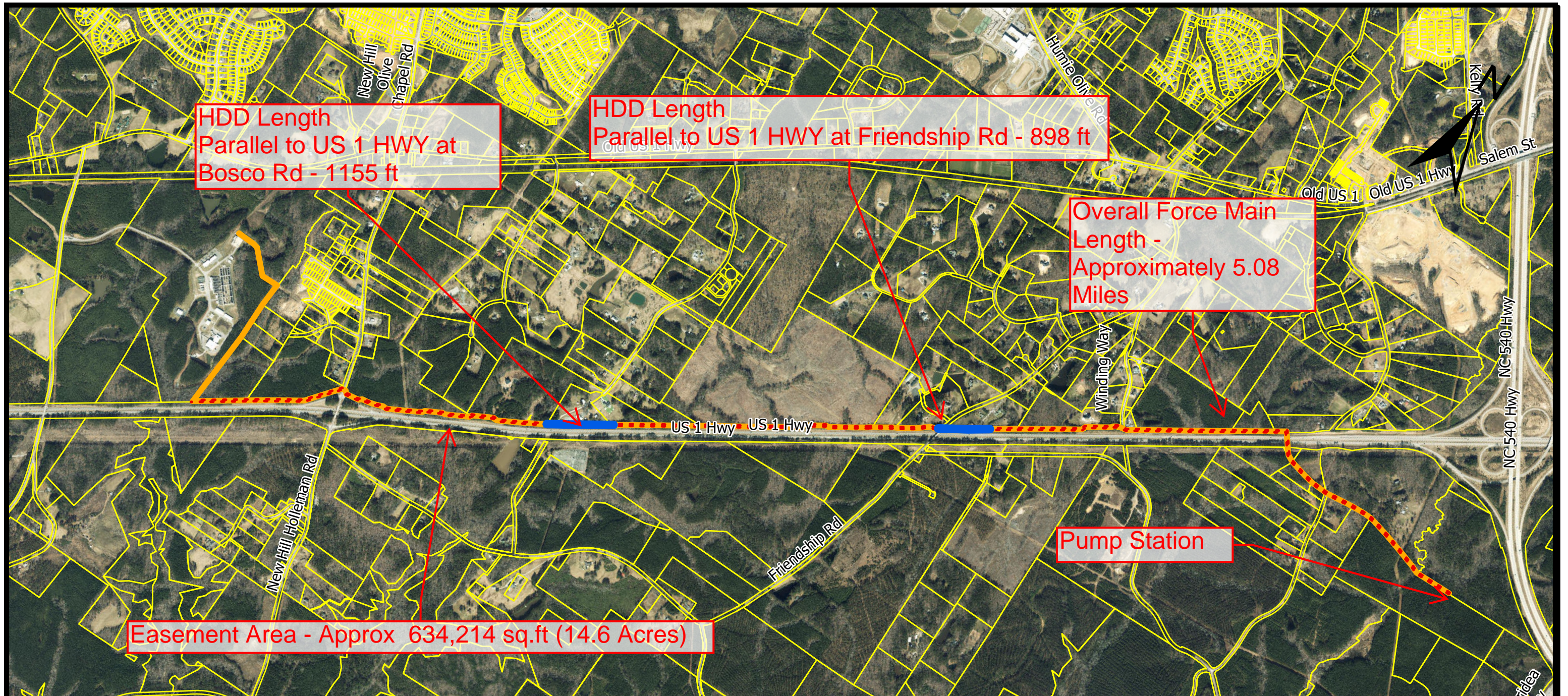
# STAFF NEEDS DIRECTION TO MOVE FORWARD WITH FORCE MAIN DESIGN

- Path 1
  - Accept NCDOT's current position that no parallel encroachment into US-1 ROW will be granted
  - Commence detailed force main design utilizing new utility easements adjacent to US-1 ROW
  - Detailed cost comparison between HDD and non-HDD options
  - 20-30 new utility easements will be required (condemnation is likely unavoidable)
- Path 2
  - Continue to appeal NCDOT's decision.
  - Potentially significantly reduce private property impacts and cost (as few as 4 new utility easements)
  - Will cause design delays
  - May be unsuccessful



Route	Permanent Easements		Temporary Easements		Force Main		Impacts	
	Area	No. of Permanent Easements	Area	No. of Temp Easements	Force Main Length	HDD Length/Number	Structures Impacted	Driveways
Option 3 - US 1 Highway	14.6 Acres	20	0.23 Acres	4	5.08 miles	2053 ft / 2	1	0
Option 4 - Bosco Rd and Winding Way Diversions	18.1 Acres	30	0.11 Acres	2	5.67 miles	0	0	11





Easement Area - Approx 634,214 sq.ft (14.6 Acres)

Route	Permanent Easements		Temporary Easements		Force Main		Impacts	
	Area	No. of Permanent Easements	Area	No. of Temp Easements	Force Main Length	HDD Length/Number	Structures Impacted	Driveways
Option 3 - US 1 Highway	14.6 Acres	20	0.23 Acres	4	5.08 miles	2053 ft / 2	1	0

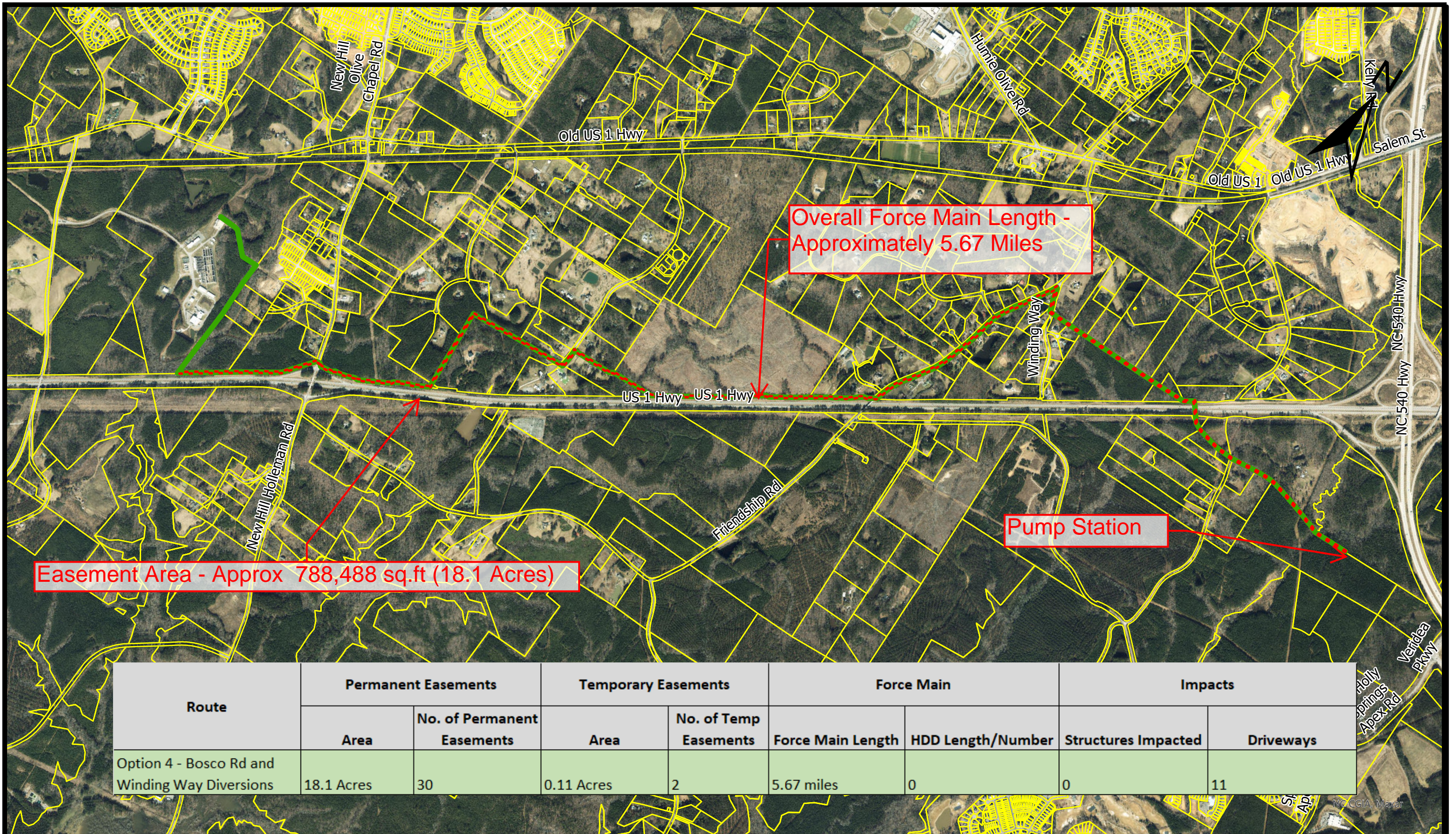


Option 3  
30FT Easement

Big Branch Force Main Routings  
Town of Apex







Easement Area - Approx 788,488 sq.ft (18.1 Acres)

Overall Force Main Length - Approximately 5.67 Miles

Pump Station

Route	Permanent Easements		Temporary Easements		Force Main		Impacts	
	Area	No. of Permanent Easements	Area	No. of Temp Easements	Force Main Length	HDD Length/Number	Structures Impacted	Driveways
Option 4 - Bosco Rd and Winding Way Diversions	18.1 Acres	30	0.11 Acres	2	5.67 miles	0	0	11



Option 4  
30FT Easement

Big Branch Force Main Routings  
Town of Apex

