

March 23, 2021

Mr. Timothy Moot, PG
CLP, acting as Town Engineer
Town of Wappinger
20 Middlebush Road
Wappinger Falls, NY 12590

RE: **Sanitary Sewer Flow Analysis**
Parcel 135689-6157-02-707773-000
Diamond Properties
1404 Route 9
Wappinger, NY

Dear Mr. Moot:

In accordance with the staff meeting at Town Hall on October 15, 2020, as well as subsequent emails and conversations with you, Dakota Partners and Diamond Properties are exploring the potential to construct approximately 144 residential units on the subject property, referenced above. The Existing Site Plan is included as Attachment A and a Proposed Concept Plan (specific to the residential addition) is included as Attachment B. The exact proposed unit and bedroom count is still being defined but at this point our most conservative count is 280 bedrooms.

It is our understanding that sanitary flows generated at the subject property discharge to a wastewater treatment facility owned and operated by Tri-Muni Sewer Commission (Tri-Muni). In order to obtain a "will serve" letter from Tri-Muni, we are required to perform a sanitary flow analysis that indicates that total discharge from the site, after final construction of the proposed residential program, will be less than the current amount of discharge allotted/permitted by Tri-Muni.

The required methodology consists of the following steps:

1. Estimated Theoretical Flow – a daily flow based on the following parameters of the subject property. The flow is determined by total acreage, assumptions for non-developable portions of the property (roads/parking), maximum building coverage [based on the zoning code and assumed sanitary flows (based on New York Department of Environmental Conservation (NYDEC))]. This flow is the amount allotted from the site by Tri-Muni.

2. Actual Theoretical Flow – a daily flow based upon the existing and proposed development program. The flow is determined by assigning NYDEC design flow rates, applied to the existing and proposed uses within the development program.
3. Actual Flow – a flow that is based on historic meter data, where available. For existing portions of the development, actual theoretical flow can be substituted with known flows, which provides a higher level of accuracy.

Estimated Theoretical Flow

Following are parameters/assumptions utilized in this computation:

- Property Size – 86.82 acres (based on property card and the survey “ALTA/SPS Land Title Survey, Alpine Commons Shopping Center, 1357 Route 9, by Republic National, Longwood, FL, dated 11/7/19.” This has been included as Attachment C.
- Non-developable property (roads and parking lots) – 15%.
- Building Footprint – 20% maximum (based on the SC use in the “Schedule of Dimensional Regulations – Nonresidential Districts” from the zoning regulations.)
- Sanitary flow rate of 0.1 gpd/sf building (based on the NYDEC, Design Standards for Intermediate Sized Wastewater Treatment Systems, 2014, Table B-3 Shopping Center/Grocery Store/Department Store.) This has been included as Attachment D.

Estimated Theoretical Flow = 86.82 ac x 0.85 (usable property) x 0.2 (max building footprint) x 43,560 sf/ac x 0.1 gpd/sf = **64,292 gpd**. This represents the daily flow allotted to the site by Tri-Muni.

Actual Theoretical Flow

Following are parameters/assumptions utilized in this computation:

- Existing Building Footprint – 212,376 sf (107,553 sf BJ's building+ 104,823 sf shopping center building) [based on the 2019 ALTA.]
- Retail sanitary flow rate of 0.1 gpd/sf building (based on NYDEC, Design Standards for Intermediate Sized Wastewater Treatment Systems, 2014, Table B-3 Shopping Center/Grocery Store/Department Store.)
- Proposed Residential Development – 280 bedrooms.
- Residential sanitary flow rate of 110 gpd/bedroom for apartments (based on NYDEC, Design Standards for Intermediate Sized Wastewater Treatment Systems, 2014, Table B-3 Residential Use.)

Actual Theoretical Flow = 21,238 gpd (212,376 sf retail/grocery x 0.1 gpd/sf) + 30,800 gpd (280 bedrooms x 110 gpd/bedrooms) = **52,038 gpd**. This represents the anticipated flow from the site with the proposed residential program, based on NYDEC design flows.

Actual Flow

The owner has historical monthly water usage that only extends back to January 2020 (Attachment E). There is a noticeable reduction in water usage from February to March and beyond, which is to be expected as Covid-related

government restrictions started in March 2020. We are therefore using February 2020 metered flows for this computation. In February 2020, the site consisted of four (4) spaces, three (3) of which were operating and one (1) which was abandoned. The operating businesses were AC Moore, BJs and Salvation Army. The abandoned space was a 64,900-sf space formerly operated as a grocery store. Since there are no records of actual flows for the abandoned grocery store, we have assumed a flow of 0.1 gpd/sf, based on Table B-3 referenced above. Additionally, we are utilizing NYDEC published data for future flows associated with the proposed residential development.

- AC Moore – 5,960 gallons (February 2020 – 29 days) – 5,960 gallons/29 days = 206 gpd
- BJ's – 72,930 gallons (February 2020 – 29 days) – 72,930 gallons/29 days = 2,515 gpd
- Salvation Army – 1,760 (February 2020 – 29 days) – 1,760 gallons/29 days = 61 gpd
- Abandoned Grocery Store Space – 0.1 gpd/sf x 64,900 sf = 6,490 gpd
- Proposed Residential Development – 110 gpd/bedroom x 280 bedrooms = 30,800 gpd

Total Actual Flow = 40,072 gpd

CONCLUSIONS

Based on accepted methodology, the site is permitted by Tri-Muni to accept 64,292 gpd sanitary flow. Utilizing NYDEC published data and methodology, as well as actual measured flows, we have provided additional analyses to compare anticipated flows with the permitted flows. Following are the results:

- Estimated Theoretical Flows (Tri-Muni Permitted Flows) – 64,292 gpd
- Actual Theoretical Flows – 52,038 gpd
- Actual Flows – 40,072 gpd

It can be seen that, utilizing two (2) methodologies to determine actual projected flows, both analyses indicate the total site sanitary flows (with the proposed residential development) will be less than that which has already been permitted by Tri-Muni.

We are requesting a “will serve” letter from Tri Muni indicating they can serve the site with the increased flows associated with the proposed conceptual residential development consisting of 280 bedrooms. If you have any questions about this information, please call or me at 860-494-4359 or wwalter@benesch.com.

Sincerely,
Benesch Engineering



Will Walter, PE
Senior Project Engineer

Attachment A
Existing Site Plan

Attachment B

Proposed Residential Site Plan

PARKING TABLE		
PROPOSED USE: MULTI-FAMILY HOUSING		
ITEM	REQUIREMENTS	PROPOSED (SUBDIVIDED MULTI-FAMILY HOUSING LOT)
TOTAL DWELLING UNITS	N/A	144
REQUIRED PARKING	1 PER RES. UNIT + 1/2 FOR EACH BEDROOM " " 216 SPACES (SEE NOTE 1)	±218 SPACES (SEE NOTE 2)
PARKING SPACE DIMENSIONS	80% MIN. AT 9' MIN. x 18' MIN. 20% MAX. AT 8' MIN. x 16' MIN. (SEE NOTE 3)	100% AT 9' MIN. x 18' MIN.
DRIVE AISLES	15' ONE-WAY 24' TWO-WAY	15' ONE-WAY 24' TWO-WAY
PARKING LOT SLOPE	5% MAX.	>5%

TABLE NOTES:
1) REQUIREMENT BASED ON DEVELOPER NEEDS. REGULATORY REQUIREMENTS CLOSER TO 2 SPACES PER UNIT.
2) PARKING COUNT QUANTIFIED IN THIS DIAGRAM ASSUMES 9' PER PARKING SPACE AT 90° SPACES AND 10.4' PER PARKING SPACE AT 60° ANGLED SPACES. COUNT ALSO ASSUMES REDUCTION OF 10% OF POSSIBLE PARKING DUE TO SNOW STORAGE, TREE ISLANDS AND ADA AISLE STRIPING.
3) PER REGULATIONS, UP TO 20% OF PARKING CAN BE SIZED AND RESERVED FOR COMPACT PARKING.

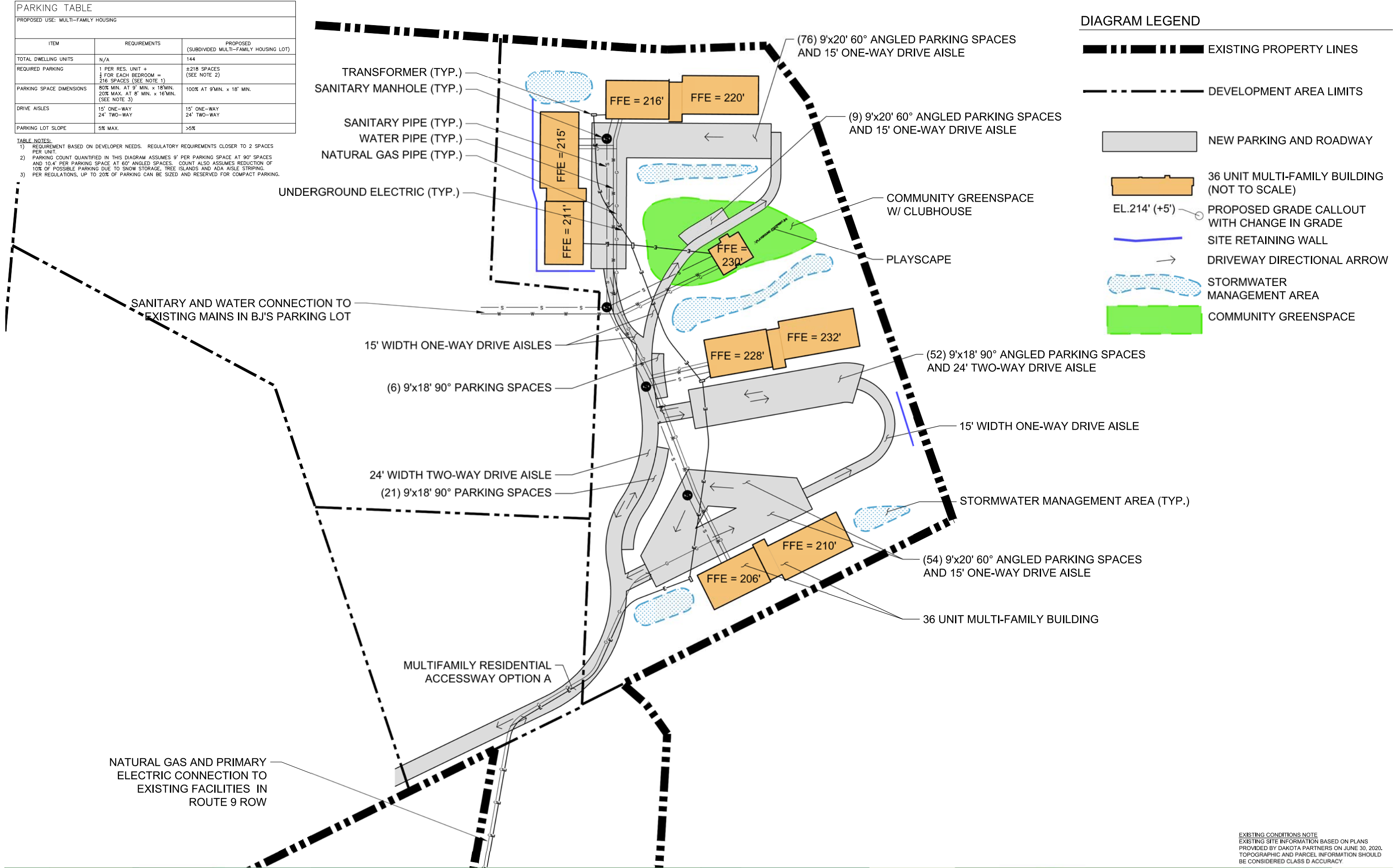


DIAGRAM LEGEND

- EXISTING PROPERTY LINES
- DEVELOPMENT AREA LIMITS
- NEW PARKING AND ROADWAY
- 36 UNIT MULTI-FAMILY BUILDING (NOT TO SCALE)
- EL. 214' (+5')
- PROPOSED GRADE CALLOUT WITH CHANGE IN GRADE
- SITE RETAINING WALL
- DRIVEWAY DIRECTIONAL ARROW
- STORMWATER MANAGEMENT AREA
- COMMUNITY GREENSPACE

RESIDENTIAL DEVELOPMENT DIAGRAM

LOT #707773: TOWN OF WAPPINGER, NY
SEPTEMBER 19, 2020



Alfred Benesch & Company
120 Hebron Avenue
Glastonbury, Connecticut 06033

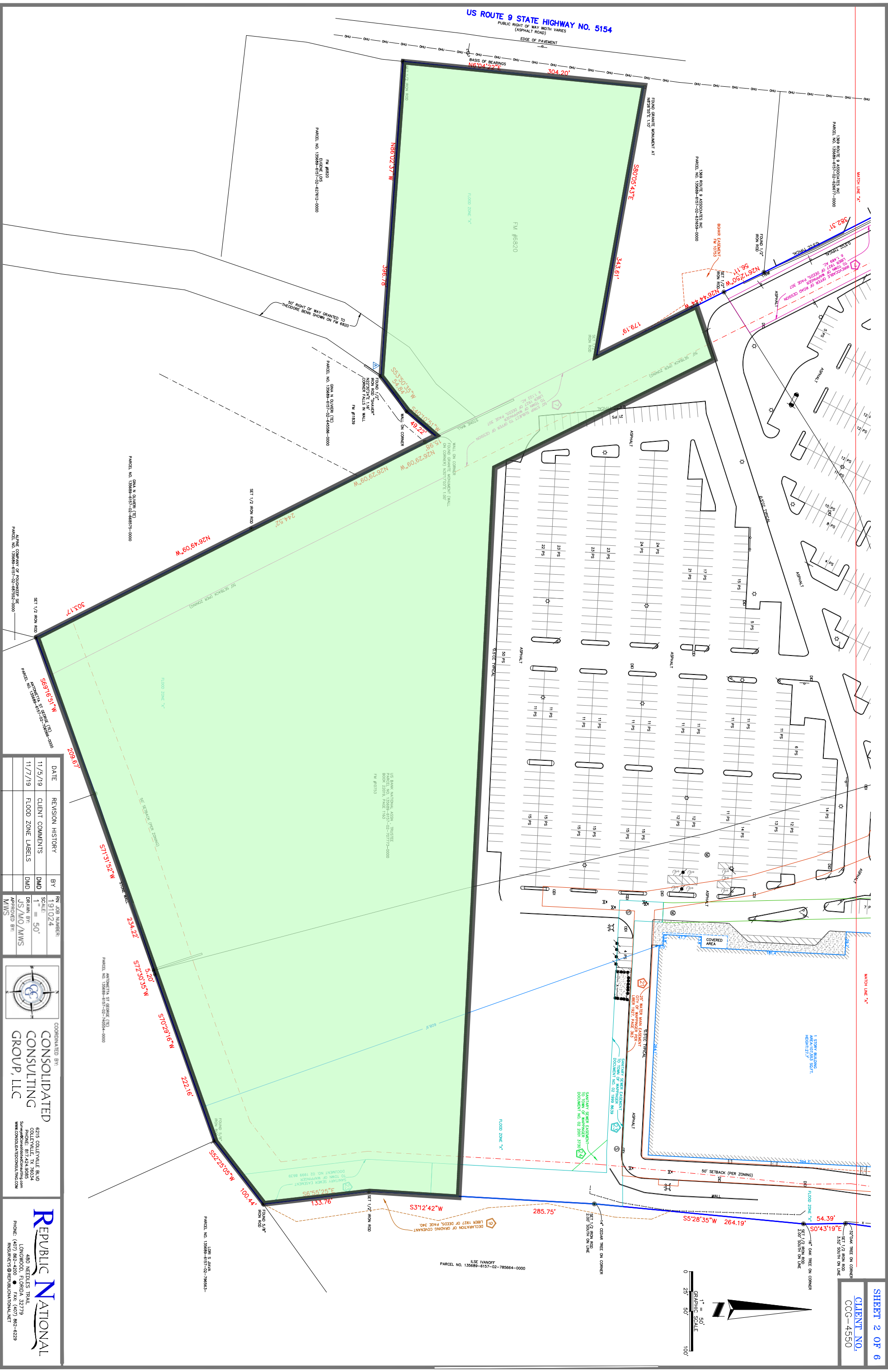
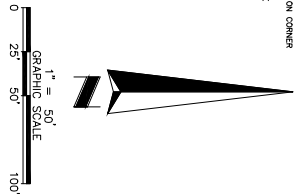


1264 Main Street
Waltham, MA 02451

EXISTING CONDITIONS NOTE
EXISTING SITE INFORMATION BASED ON PLANS
PROVIDED BY DAKOTA PARTNERS ON JUNE 30, 2020.
TOPOGRAPHIC AND PARCEL INFORMATION SHOULD
BE CONSIDERED CLASS D ACCURACY.

Attachment C

ALTA Survey



DATE	REVISION HISTORY	BY
11/5/19	CLIENT COMMENTS	DMD
11/7/19	FLOOD ZONE LABELS	DMD

11/7/19	FLOOD ZONE LABELS	DMD
11/7/19	FLOOD ZONE LABELS	DMD



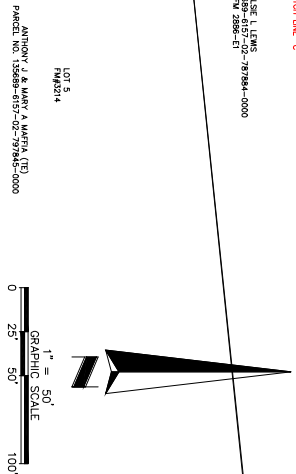
COORDINATED BY:
CONSOLIDATED CONSULTING GROUP, LLC
6215 COLLETTVILLE BLVD
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LONGWOOD, FLORIDA 32119
PHONE: (407) 862-4200 • FAX: (407) 862-6229
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PARCEL NO. 135689-8157-02-797884-0000
F42285

ELISE L. LEWIS
PARCEL NO. 135689-8157-02-797884-0000
F42286

ANTHONY J. & MARY A. MARTA, TRS
PARCEL NO. 135689-8157-02-797884-0000
F42287

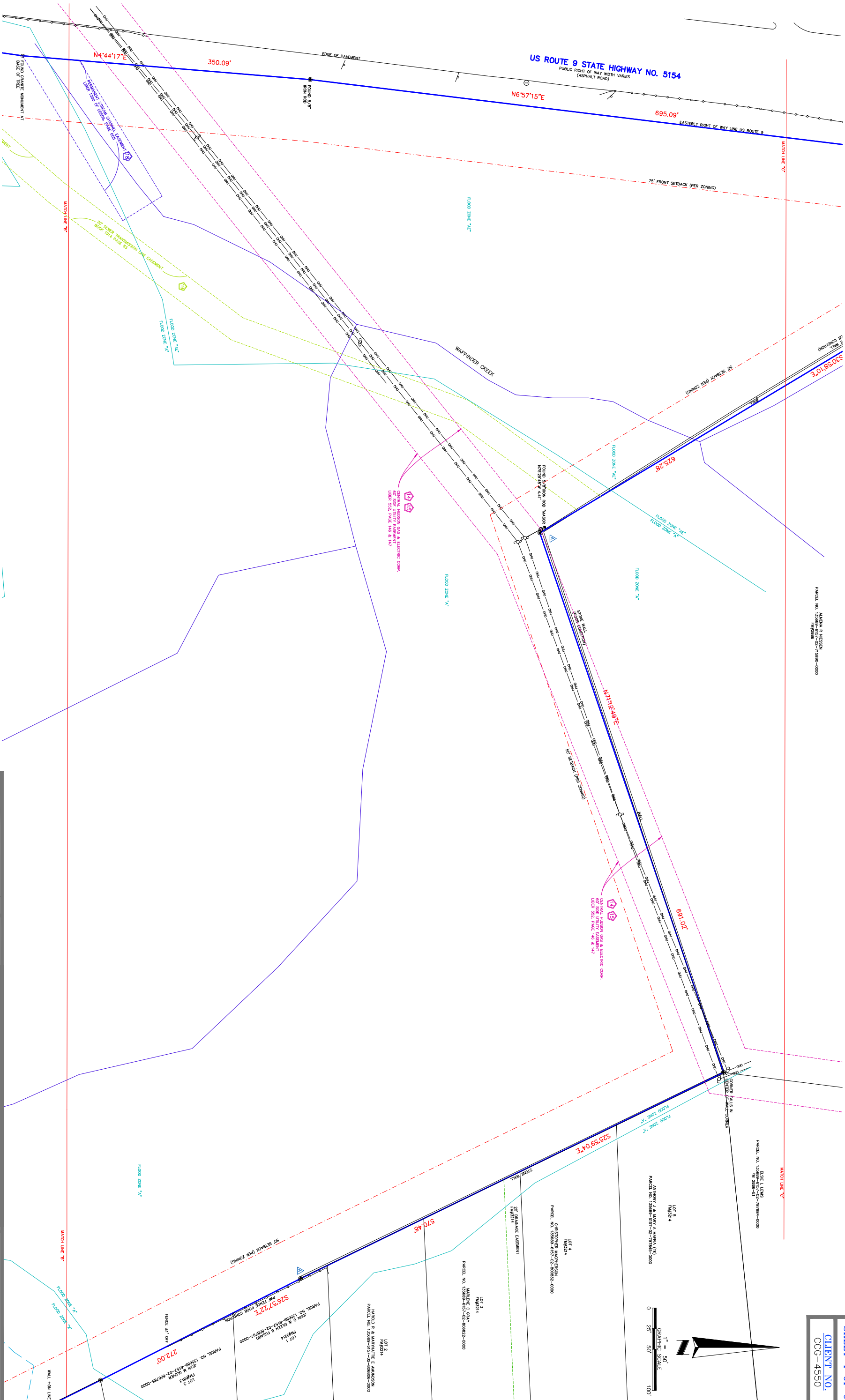
LOT 4
F42214
CHRISTOPHER W. MCDONNELL
PARCEL NO. 135689-8157-02-800832-0000

LOT 3
F42214
WILLIAM J. MCDONNELL
PARCEL NO. 135689-8157-02-800832-0000

LOT 2
F42214
JANET R. & MARILYN E. MCDONNELL
PARCEL NO. 135689-8157-02-800832-0000

LOT 1
F42214
JOHN D. & EILEEN B. FUSARO
PARCEL NO. 135689-8157-02-800832-0000

LOT 3
F42214
JEAN M. & GUYEN
PARCEL NO. 135689-8157-02-800832-0000



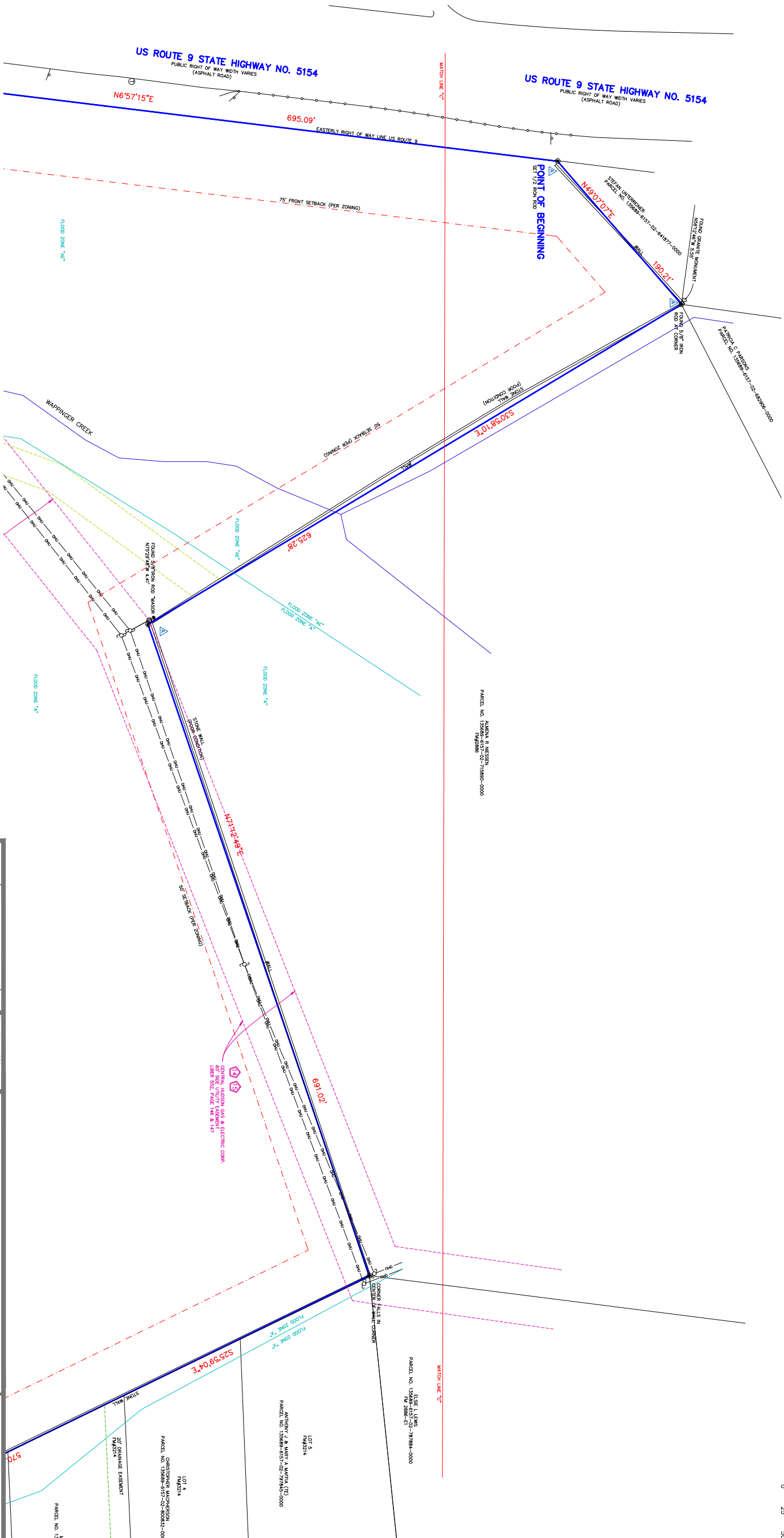
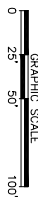
DATE	REVISION HISTORY	BY	PN, SS, NUMBER
11/5/19	CLIENT COMMENTS	DWD	191024
11/7/19	FLOOD ZONE LABELS	DWD	191024
			191024



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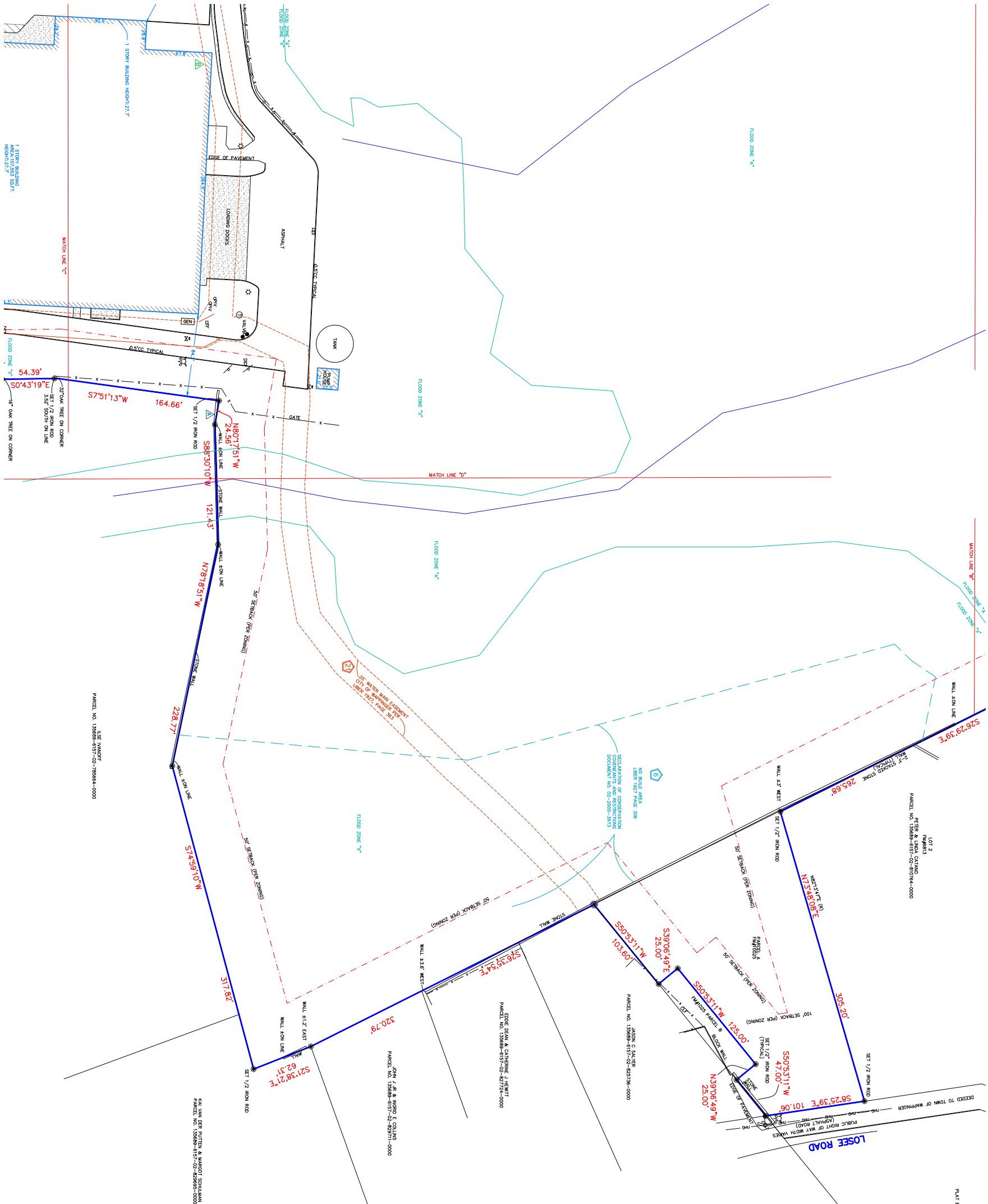
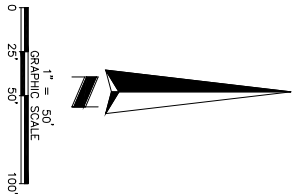
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DATE	REVISION HISTORY	BY	
11/5/19	CLIENT COMMENTS	DMD	
11/7/19	FLOOD ZONE LABELS	DMD	
SCALE:		1" = 50'	
DRAWN BY:		JS/MO/MWS	
APPROVED BY:			
MWS			



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DATE	REVISION HISTORY	BY
11/5/19	CLIENT COMMENTS	DMD
11/7/19	FLOOD ZONE LABELS	DMD
		US/MO/MMS
		US/MO/MMS



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Attachment D

NYDEC Design Standards for Intermediate Sized WWTS

Table B-3

etc.) and exclude extraneous data. There should be a reasonable explanation for the operational variations and any extraneous data excluded.

Method 3: Water Usage Data

A minimum of one year of data collected during similar operational conditions may be required by the Reviewing Engineer. If sufficient measured water usage data is not available, Method 3 should not be used. The average of the daily (24-hour) flow over the duration of the data collection period is an acceptable method for determining the average daily flow rate. The largest daily (24-hour) measured volume during the same period expressed in volume per unit time is an acceptable method for determining the maximum day flow rate. The analysis should account for operational variations (e.g. peak seasonal, weekends, special events, delivery period, etc.) and exclude extraneous data. There should be a reasonable explanation for operational variations and any extraneous data excluded.

For each of these methods, the peak hourly flow rate (largest hourly volume expressed in volume per unit time) should also be identified. When variation in the wastewater flow rate is expected to be substantial, it is necessary to examine the significant delivery period of the wastewater and base the system design upon this information to prevent an excessive rate of flow through wastewater collection and treatment systems. Flow equalization prior to treatment units should be considered to avoid hydraulic overloading of treatment units during peak loading periods (peak hourly flow and maximum daily flow).

Table B-3 Typical Per-Unit Hydraulic Loading Rates

Residential

<i>Type of Use</i>	<i>Unit</i>	<i>Gallons per Day</i>
Apartment	Per Bedroom	110/130/150 ¹⁶
Mobile Home Park	“Single-Wide” Home	220
	“Double-Wide” Home	330
Single Family Residence	Per Bedroom	110 / 130/ 150 ¹⁷

¹⁶ 110 gpd for post 1994 plumbing code fixtures; 130 gpd for pre 1994 fixtures; and 150 gpd for pre 1980 fixtures. Homes over 1,000 gpd, community systems, or lodging establishments with high flow fixtures must account for any higher peak flow periods.

¹⁷ For individual household systems under 1,000 gpd, use design flows in the NYSDOH’s *Wastewater Treatment Standards Residential Onsite Systems - Appendix 75- A*.

Campgrounds

<i>Type of Use</i>	<i>Unit</i>	<i>Gallons per Day</i>
Day Camp	Per Person	15
	Add for Shower	5
	Add for Lunch	5
Campground	Per Unsewered Site ¹⁸	55(includes showers)
	Per Sewered Site – with water hookups	100
	Per Sewered Site – without water hookups	55
Campground Day Use	Per Person	5
Dumping Station ¹⁹	Per Unsewered Site	10
	Per Sewered Site	5

Institutional

<i>Type of Use</i>	<i>Unit</i>	<i>Gallons per Day</i>
Assisted Living Facility/Complex	Per Bed ^{20,21} – add 10 gpd for in room kitchen	110/130/150
Group Home (residential-style building)	Per Bed ²⁰ - add 150 gpd per house for garbage grinder	110/130/150
Nursing Home (hospital care)	Per Bed ^{20,21}	175
Hospital	Per Bed ^{20,21}	175
	Per Outpatient	30
Church	Per Seat ²⁰	3
Church Hall/Fire Hall	Per Seat ²¹	10

¹⁸ Additional wastewater flow due to food service or laundry shall be accounted for. Structures available for overnight occupancy other than those meeting the definition of a camping unit shall be based on 150 gpd / unit for design flow purposes, pursuant to NYSDOH – *Chapter 1 State Sanitary Code Subpart 7-3 Campgrounds*.

¹⁹ The addition of flow for dump station sewage may be prorated by using an estimated percentage of sites suited for RV use based on historical data. No reduction for low flow fixture usage should be applied here.

²⁰ Add 15 gpd per employee

²¹ Add for Food Service (e.g. 24-hour restaurant; refer to Food Service Operations Table)

Library/ Museum	Per Patron ^{20,21}	5
Public Park	Per Person (toilet only)	5
Prison / Jail	Per Inmate ^{20,21}	150
School – Day	Per Student	10
- or -	Elem./ Jr. High / Sr. High	7 / 9 / 12
- and -	Add for meals / showers	5 / 5
School Boarding	Per Student ^{20,21}	75

Commercial

<i>Type of Use</i>	<i>Unit</i>	<i>Gallons per Day</i>
Airport/Bus/Rail Terminal	Per Passenger ²²	5
	Per Toilet	400
Barber Shop / Beauty Salon	Per Station without and with hair care sink	50/ 200
Bowling Alley	Per Lane ^{22,23}	75
Bed & Breakfast	Per Room (see note under Residential)	110/130/150
Casino	Per Employee/shift plus	15
	Per Sq. Ft. for non-lodging customer use	0.3
Country Clubs & Golf Courses	Per Round of Golf ^{21,22} (add for bar, banquet, shower or pool facilities and golf tournaments)	20
Concert Hall / Arena / Assembly Hall / Theater / Stadium / Skating Rink	Per Seat ^{21,22}	5
Day Care	Per Child ²¹	20
Doctors Office	Per Doctor	250
Dog / Pet Grooming	Per Station	500
Also see Kennel and Veterinary Office below.		
Dentist	Per Chair ²⁴	250

²² Add 15 gpd per employee/shift

²³ Add for Food Service (e.g. 24 hour restaurant; refer to Food Service Operations Table)

²⁴ Dental offices must recycle mercury amalgam instead of washing it down the drain. NYSDEC's website has

Drive-In Theater	Per Car Space ²⁵	5
Factory / Distribution Warehouse	Per Employee/shift; add for showers	15 10
Fairgrounds	Per Visitor ²⁵	5
Health Club	Per Patron	20
Highway Rest Area	Per Traveler ²⁵ Per Dump Station Vehicle	5 7
Hotel	Per Sleeping Unit ²⁵ add for banquet hall, night club, pool/spa, theatre, etc.	110/130/150
Kennel	Per Kennel/Run/Cage	50
Laundromat	Per Machine	580
Marina	Per Slip ²⁵ with shore side restroom facilities including shower; add per slip for dump station	20 7
Migrant Worker Housing	Per Person	50
Motel	Per Sleeping Unit; add for in-room kitchen; add for in-room jacuzzi/spa	110/130/150 10 20
Office Building	Per Employee ²⁵ ; add for showers	15 5
Service station/Convenience store	Per Toilet ²⁵	400
Shopping Center / Grocery Store / Department Store	Per Sq. Ft. ^{25,26} ; add for deli, bakery, butcher	0.1
Swimming Pool / Bath House	Per Swimmer	10
Veterinary Office	Per Veterinarian	200

guidance referencing the 2002 law.

²⁵ Add for Food Service (e.g. 24-hour restaurant; refer to Food Service Operations Table)

²⁶ Add 15 gpd per employee/shift

Food Service Operations²⁷

<i>Type of Use</i>	<i>Unit</i>	<i>Gallons per Day</i>
Ordinary Restaurant	Per Seat	35
24-Hour Restaurant	Per Seat (for cafeterias: pro rate flow in proportion to the hours)	50
Fast Food Restaurant	Per Seat	25
	Per Drive-Up Window	500
Lounge, Bar	Per Seat	20
Drive-In	Per Car Space	50
Banquet Hall	Per Seat	10
Restaurant along Freeway	Per Seat	75

B.6.c Infiltration, Inflow, Non-Sanitary and Prohibited Flows

Cooling water, roof drains, footing, sump and basement floor drains should not be discharged to the treatment system. Clean water from ice machines, water cooled refrigerators or coolers should also be excluded. Undetected leaks from plumbing fixtures, typically toilets and faucets, can waste significant amounts of water and subsequently increase the volume of wastewater to be treated. Simple repairs and routine operation and maintenance of plumbing fixtures can save water and increase the efficiency of wastewater treatment system.

Similarly, leaking sewer joints, pipe tank seals, tank riser seals, cracks in treatment tanks and manhole covers that are not watertight can be significant sources of infiltration of the system. These extraneous flows can cause periodic hydraulic overloads and affect treatment performance which can lead to system failure. Exfiltration from the system can have a negative impact on groundwater quality.

The discharge of swimming pool filter backwash wastewater should not be directed to a septic tank

²⁷ Garbage grinder use should be evaluated in the design phase of the project and accounted for in tank sizing per Section D.6 Septic Tanks.

Attachment E

Site Historical Water Usage

Chestnut Plaza Water Meter Readings 2019

MONTH	DATE	AC Moore Gallons	USAGE Gallons	BJ's Cu. Feet	USAGE Gallons	Salvation A. Cu. Feet	USAGE Gallons	Abandoned Cu. Feet	USAGE Gallons	
January	1/1/2020	2210000	0	2519200	0	201270	0	72472	0	
February	2/1/2020	2210000	5,960	2519200	72,930	201270	1,760	72472	0	
March	3/1/2020	2215960	0	2528950	32,388	203030	224	72472	0	
April	4/1/2020	2215960	10	2533280	43,908	203060	210	72472	0	
May	5/1/2020	2215970	0	2539150	81,682	203270	0	72472	0	
June	6/1/2020	2215970	0	2550070	34,857	203270	0	72472	0	
July	7/1/2020	2215970	0	2554730	36,353	203270	0	72472	0	
August	8/1/2020	2215970	0	2559590	0	203270	70	72472	0	
September	9/1/2020	2215970	140	2559590	45,927	203340	0	72472	0	
October	10/1/2020	2216110	0	2565730	34,558	203340	10	72472	0	
November	11/1/2020	2216110	10	2570350	35,380	203350	10	72472	0	
December	12/1/2020	2216120	505	2575080	42,636	203360	0	72472	0	
Jan-21		2216625		2580780		203360		72472		

Comments: Walgreen's Actual Usage- Usage for Irrigation is tied in with Walgreen's meter so actual usage for Walgreen's is the difference between the total gals. of the two readings.

	AC Moore	BJ's	Salvation A.	
Total	6,625	460,618	2,284	0
Average	552	38,385	190	0