



Technical Memorandum

To: Brandon Anderson, PE, City Engineer
City of Apple Valley

From: Brian Weiss, PE, Hydraulic Modeling Engineer
AES2

Re: Orchard Place Development – Wastewater Sewer System Analysis

Date: March 25, 2025

Background

This analysis consists of evaluating the impacts to the Apple Valley sanitary sewer system based on current and proposed development within the Orchard Place Development. Figure 1 shows the boundary of the planning area considered in this analysis. This analysis includes the following scenarios:

- Scenario 1: Comprehensive Plan 2040
- Scenario 2: Without Data Center – current landuse and layout areas
- Scenario 3: With Data Center
- Scenario 4: With Two Data Centers
- Scenario 5: MBC replaced with Medium Density Residential
- Scenario 6: MBC replaced with Low Density Residential



Figure 1: Planning Area Boundary

Wastewater Sewer Flows

Table 1: Summary of Wastewater Sewer Flows for Each Scenario

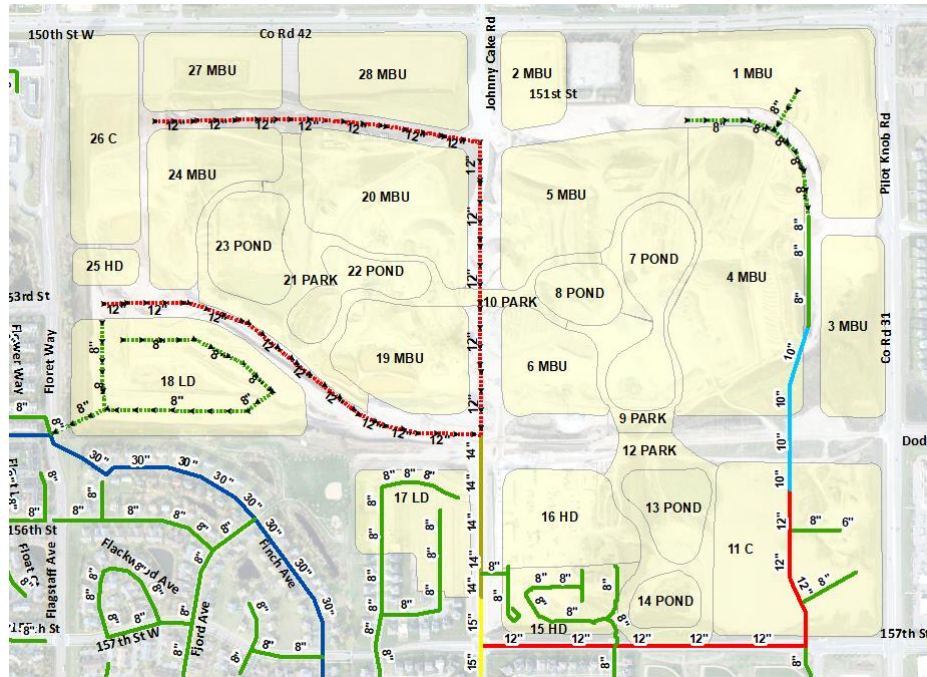
Planning Scenario	Wastewater System					
	Peak Hourly Flow (PHF) (gpd)	Difference		Average Day Flow (ADF) (gpd)	Difference	
		(gpd)	(gpm)		(gpd)	(gpm)
Scenario 1: Comprehensive Plan - 2040	1,405,677	NA	NA	390,466	NA	NA
Scenario 2: Without Data Center	1,534,452	128,775	89.4	438,415	47,949	33.3
Scenario 3: With Data Center	1,783,233	377,556	262.2	964,787	574,321	398.8
Scenario 4: Data Center + Data Center east of JCRR	1,966,077	560,400	389.2	1,301,938	911,472	633.0
Scenario 5: MBC replaced with Medium Density Residential	1,821,589	415,913	288.8	535,762	145,296	100.9
Scenario 6: MBC replaced with Low Density Residential	1,169,437	-	-164.1	324,844	-65,622	-45.6

Scenario 1: Comprehensive Plan -2040

Table 2: Scenario 1 Sewer Flows

Scenario 1: Comprehensive Plan - 2040						
LAND USE	Area (ac)	Average Day Flow (gpd/ac)	Usage per Unit (gpcd)	Average Day Flow (ADF) (gpd)	Peaking Factor (ADF to PHF)	Peak Hourly Flow (PHF) (gpd)
DATA CENTER			N/A	-	1.00	-
DATA CENTER - Domestic			N/A	-	3.60	-
DATA CENTER - Cooling Water - East of JCRR			N/A	-	1.00	-
DATA CENTER - Domestic - East of JCRR			N/A	-	3.60	-
MIXED-BUSINESS USE	164.5	1,500	N/A	246,802	3.60	888,486
COMMERCIAL	40.7	2,000	N/A	81,444	3.60	293,200
INDUSTRIAL		2,000	N/A	-	3.60	-
OFFICE		2,000	N/A	-	3.60	-
INSTITUTIONAL		2,000	N/A	-	3.60	-
HOTEL		2,000	N/A	-	3.60	-
OFFICE, INDUSTRIAL, MEDICAL (OIM)			N/A	-	3.60	-
OFFICE, RETAIL, HOTEL, MEDICAL (ORHM)			N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL (ORM)			N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL, IND, CORPORATE (ORMIC)			N/A	-	3.60	-
LOW DENSITY RESIDENTIAL	33.8	630	N/A	21,303	3.60	76,691
MEDIUM DENSITY RESIDENTIAL			N/A	-	3.60	-
HIGH DENSITY RESIDENTIAL	20.9	1,960	N/A	40,917	3.60	147,300
OPEN SPACE	30.4		N/A	N/A	N/A	N/A
OPEN WATER	35.6		N/A	N/A	N/A	N/A
RIGHT-OF-WAY (COLLECTORS AND ARTERIALS)			N/A	N/A	N/A	N/A
PARCEL ID #2 - Defined Development			N/A	N/A	N/A	N/A
PARCEL ID #4 - Defined Development			N/A	N/A	N/A	N/A
PARCEL ID #6 - Defined Development			N/A	N/A	N/A	N/A
PARCEL ID #9 - Defined Development			N/A	N/A	N/A	N/A
PARCEL ID #10 - Defined Development			N/A	N/A	N/A	N/A
TOTAL	326.0			390,466		1,405,677

Technical Memorandum
Orchard Place Development – Wastewater Sewer System Analysis
March 25, 2025



Technical Memorandum
Orchard Place Development – Wastewater Sewer System Analysis
March 25, 2025

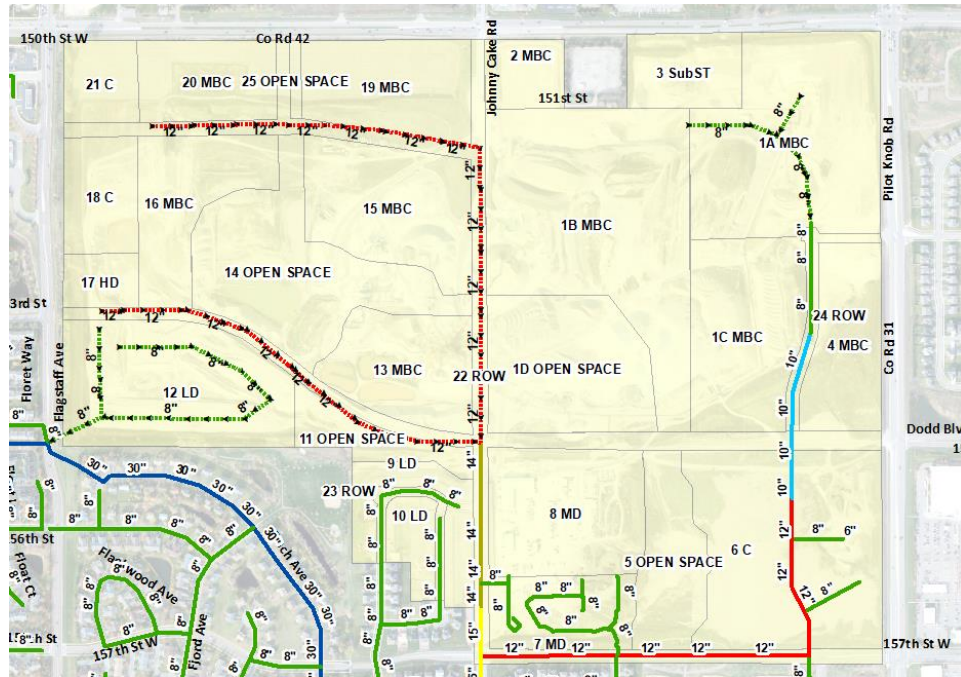


Figure 3: Layout of Scenario 2 – Updated Planning without Data Center

Scenario 3: Updated Planning with Data Center

Table 4: Scenario 3 Sewer Flows

Scenario 3: Future Planning - With Data Center						
LAND USE	Area (ac)	Average Day Flow (gpd/ac)	Usage per Unit (gpcd)	Average Day Flow (ADF) (gpd)	Peaking Factor (ADF to PHF)	Peak Hourly Flow (PHF) (gpd)
DATA CENTER			N/A	650,000	1.00	650,000
DATA CENTER - Domestic			N/A	6,075	3.60	21,870
DATA CENTER - Cooling Water - East of JCRR	73.5		N/A	-	1.00	-
DATA CENTER - Domestic - East of JCRR			N/A	-	3.60	-
MIXED-BUSINESS USE	69.6	1,400	N/A	97,440	3.60	350,782
COMMERCIAL	13.7	400	N/A	5,491	3.60	19,769
INDUSTRIAL		1,400	N/A	-	3.60	-
OFFICE		550	N/A	-	3.60	-
INSTITUTIONAL		70	N/A	-	3.60	-
HOTEL		2,100	N/A	-	3.60	-
OFFICE, INDUSTRIAL, MEDICAL (OIM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, HOTEL, MEDICAL (ORHM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL (ORM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL, IND, CORPORATE (ORMIC)		1,400	N/A	-	3.60	-
LOW DENSITY RESIDENTIAL	24.9	700	N/A	17,409	3.60	62,671
MEDIUM DENSITY RESIDENTIAL	28.1	2,000	N/A	56,296	3.60	202,666
HIGH DENSITY RESIDENTIAL	3.8	2,800	N/A	10,511	3.60	37,839
OPEN SPACE	81.1		N/A	N/A	N/A	N/A
OPEN WATER			N/A	N/A	N/A	N/A
RIGHT-OF-WAY (COLLECTORS AND ARTERIALS)			N/A	N/A	N/A	N/A
PARCEL ID #2 - Defined Development	5.1		N/A	5,480	3.60	19,728
PARCEL ID #4 - Defined Development	12.1		N/A	18,017	3.60	64,863
PARCEL ID #6 - Defined Development	33.8		N/A	86,568	3.60	311,645
PARCEL ID #9 - Defined Development	7.3		N/A	7,500	3.60	27,000
PARCEL ID #10 - Defined Development	3.8		N/A	4,000	3.60	14,400
TOTAL	356.9			964,787		1,783,233

Technical Memorandum
Orchard Place Development – Wastewater Sewer System Analysis
March 25, 2025

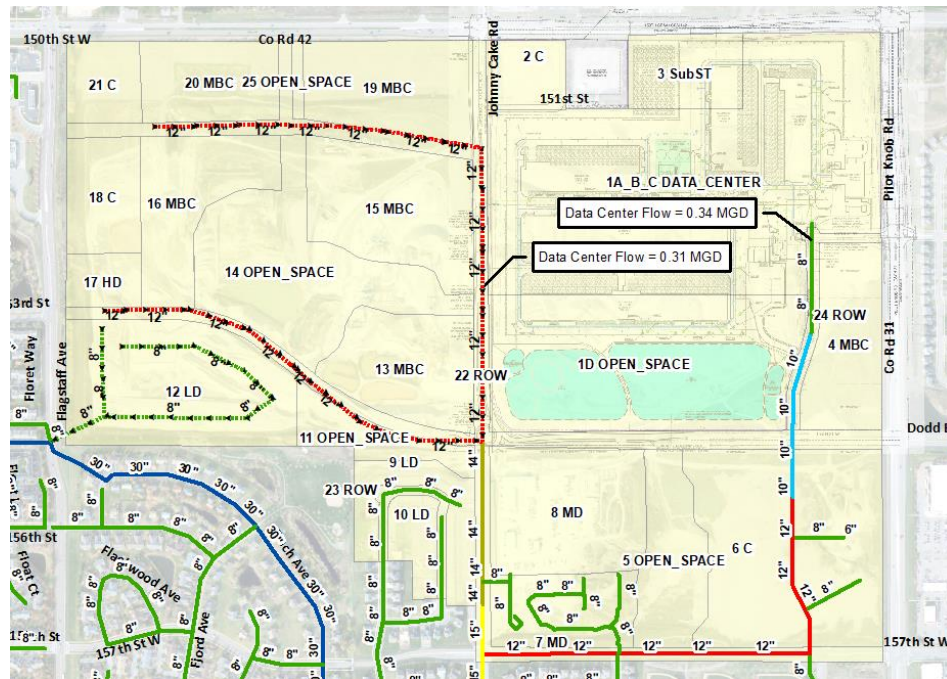


Figure 4: Layout of Scenario 3 – Updated Planning with Data Center

Scenario 4: Data Center and Data Center east of JCRR

Table 5: Scenario 4 Sewer Flows

Scenario 4: Future Planning - Two Data Centers						
LAND USE	Area (ac)	Average Day Flow (gpd/ac)	Usage per Unit (gpcd)	Average Day Flow (ADF) (gpd)	Peaking Factor (ADF to PHF)	Peak Hourly Flow (PHF) (gpd)
DATA CENTER			N/A	650,000	1.00	650,000
DATA CENTER - Domestic			N/A	6,075	3.60	21,870
DATA CENTER - Cooling Water - East of JCRR	73.5		N/A	396,500	1.00	396,500
DATA CENTER - Domestic - East of JCRR	45.0		N/A	3,700	3.60	13,320
MIXED-BUSINESS USE	24.6	1,400	N/A	34,391	3.60	123,807
COMMERCIAL	13.7	400	N/A	5,491	3.60	19,769
INDUSTRIAL		1,400	N/A	-	3.60	-
OFFICE		550	N/A	-	3.60	-
INSTITUTIONAL		70	N/A	-	3.60	-
HOTEL		2,100	N/A	-	3.60	-
OFFICE, INDUSTRIAL, MEDICAL (OIM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, HOTEL, MEDICAL (ORHM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL (ORM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL, IND, CORPORATE (ORMIC)		1,400	N/A	-	3.60	-
LOW DENSITY RESIDENTIAL	24.9	700	N/A	17,409	3.60	62,671
MEDIUM DENSITY RESIDENTIAL	28.1	2,000	N/A	56,296	3.60	202,666
HIGH DENSITY RESIDENTIAL	3.8	2,800	N/A	10,511	3.60	37,839
OPEN SPACE	81.1		N/A	N/A	N/A	N/A
OPEN WATER			N/A	N/A	N/A	N/A
RIGHT-OF-WAY (COLLECTORS AND ARTERIALS)			N/A	N/A	N/A	N/A
PARCEL ID #2 - Defined Development	5.1		N/A	5,480	3.60	19,728
PARCEL ID #4 - Defined Development	12.1		N/A	18,017	3.60	64,863
PARCEL ID #6 - Defined Development	33.8		N/A	86,568	3.60	311,645
PARCEL ID #9 - Defined Development	7.3		N/A	7,500	3.60	27,000
PARCEL ID #10 - Defined Development	3.8		N/A	4,000	3.60	14,400
TOTAL	356.9			1,301,938		1,966,077

Technical Memorandum
Orchard Place Development – Wastewater Sewer System Analysis
March 25, 2025

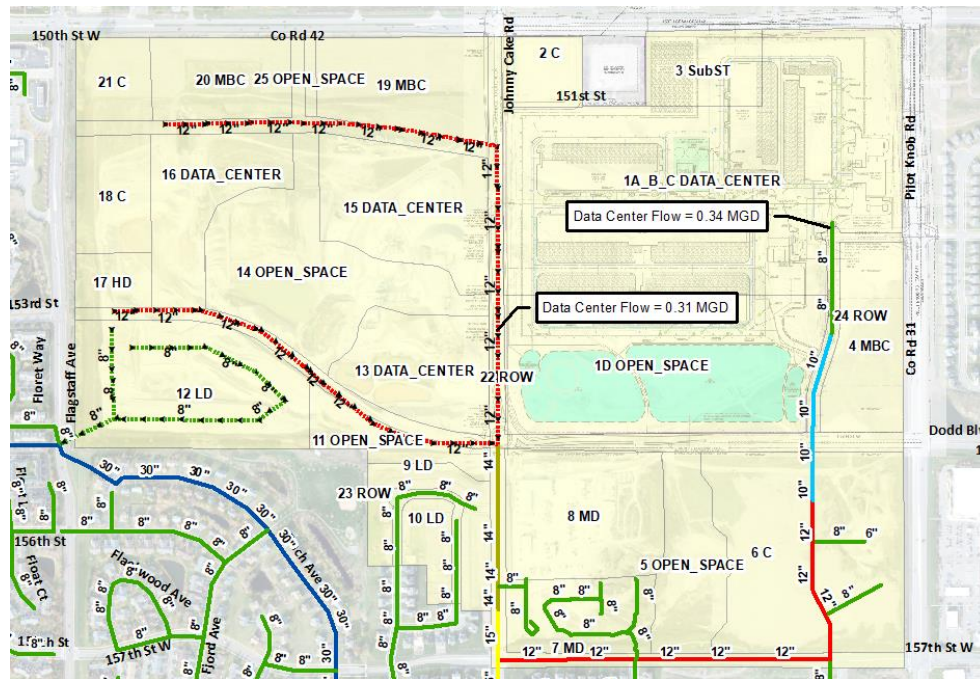


Figure 5: Layout of Scenario 4 – Data Center and Data Center east of JCRR

Scenario 5: MBC replaced with Medium Density Residential

Table 6: Scenario 5 Sewer Flows

Scenario 5: Future Planning - MBC replaced with MD Residential						
LAND USE	Area (ac)	Average Day Flow (gpd/ac)	Usage per Unit (gpcd)	Average Day Flow (ADF) (gpd)	Peaking Factor (ADF to PHF)	Peak Hourly Flow (PHF) (gpd)
DATA CENTER			N/A	-	1.00	-
DATA CENTER - Domestic			N/A	-	3.40	-
DATA CENTER - Cooling Water - East of JCRR			N/A	-	1.00	-
DATA CENTER - Domestic - East of JCRR			N/A	-	3.40	-
MIXED-BUSINESS USE	0.0	1,400	N/A	-	3.40	-
COMMERCIAL	13.7	400	N/A	5,491	3.40	18,670
INDUSTRIAL		1,400	N/A	-	3.40	-
OFFICE		550	N/A	-	3.40	N/A
INSTITUTIONAL		70	N/A	-	3.40	N/A
HOTEL		2,100	N/A	-	3.40	N/A
OFFICE, INDUSTRIAL, MEDICAL (OIM)		1,400	N/A	-	3.40	N/A
OFFICE, RETAIL, HOTEL, MEDICAL (ORHM)		1,400	N/A	-	3.40	-
OFFICE, RETAIL, MEDICAL (ORM)		1,400	N/A	-	3.40	-
OFFICE, RETAIL, MEDICAL, IND, CORPORATE (ORMIC)		1,400	N/A	-	3.40	-
LOW DENSITY RESIDENTIAL	24.9	700	N/A	17,409	3.40	59,190
MEDIUM DENSITY RESIDENTIAL	190.4	2,000	N/A	380,785	3.40	1,294,670
HIGH DENSITY RESIDENTIAL	3.8	2,800	N/A	10,511	3.40	35,737
OPEN SPACE	62.0		N/A	N/A	N/A	N/A
OPEN WATER			N/A	N/A	N/A	N/A
RIGHT-OF-WAY (COLLECTORS AND ARTERIALS)			N/A	N/A	N/A	N/A
PARCEL ID #2 - Defined Development	5.1		N/A	5,480	3.40	18,632
PARCEL ID #4 - Defined Development	12.1		N/A	18,017	3.40	61,259
PARCEL ID #6 - Defined Development	33.8		N/A	86,568	3.40	294,331
PARCEL ID #9 - Defined Development	7.3		N/A	7,500	3.40	25,500
PARCEL ID #10 - Defined Development	3.8		N/A	4,000	3.40	13,600
TOTAL	356.9			535,762		1,821,589

Technical Memorandum
Orchard Place Development – Wastewater Sewer System Analysis
March 25, 2025

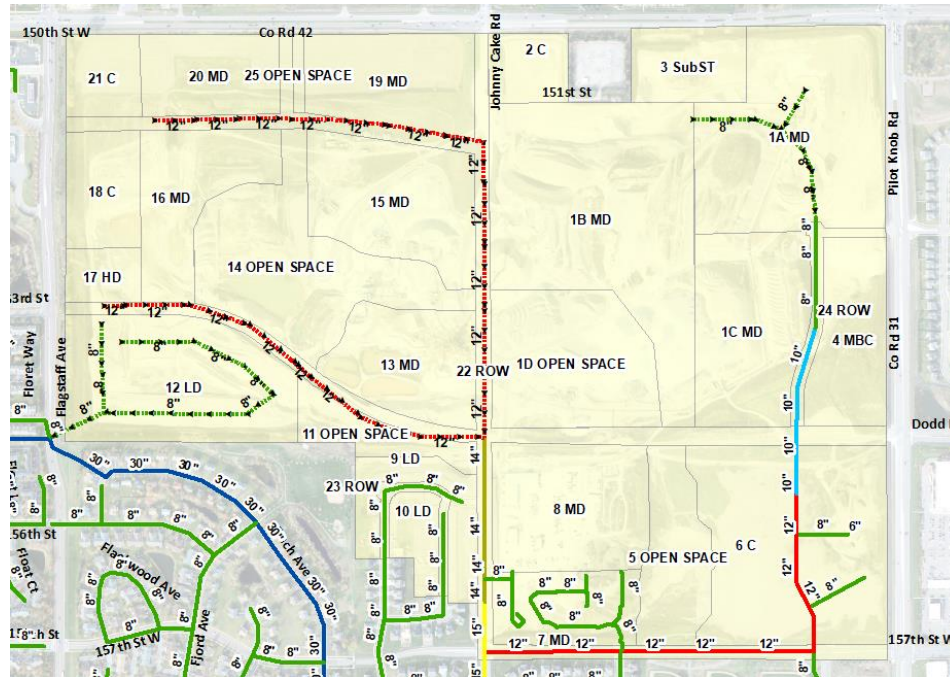


Figure 6: Layout of Scenario 5 – MBC replaced with Medium Density Residential

Scenario 6: MBC replaced with Low Density Residential

Table 7: Scenario 6 Sewer Flows

Scenario 6: Future Planning - MBC replaced with LD Residential						
LAND USE	Area (ac)	Average Day Flow (gpd/ac)	Usage per Unit (gpcd)	Average Day Flow (ADF) (gpd)	Peaking Factor (ADF to PHF)	Peak Hourly Flow (PHF) (gpd)
DATA CENTER			N/A	-	1.00	-
DATA CENTER - Domestic			N/A	-	3.60	-
DATA CENTER - Cooling Water - East of JCRR			N/A	-	1.00	-
DATA CENTER - Domestic - East of JCRR			N/A	-	3.60	-
MIXED-BUSINESS USE	0.0	1,400	N/A	-	3.60	-
COMMERCIAL	13.7	400	N/A	5,491	3.60	19,769
INDUSTRIAL		1,400	N/A	-	3.60	-
OFFICE		550	N/A	-	3.60	N/A
INSTITUTIONAL		70	N/A	-	3.60	N/A
HOTEL		2,100	N/A	-	3.60	N/A
OFFICE, INDUSTRIAL, MEDICAL (OIM)		1,400	N/A	-	3.60	N/A
OFFICE, RETAIL, HOTEL, MEDICAL (ORHM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL (ORM)		1,400	N/A	-	3.60	-
OFFICE, RETAIL, MEDICAL, IND, CORPORATE (ORMIC)		1,400	N/A	-	3.60	-
LOW DENSITY RESIDENTIAL	187.1	700	N/A	130,980	3.60	471,528
MEDIUM DENSITY RESIDENTIAL	28.1	2,000	N/A	56,296	3.60	202,666
HIGH DENSITY RESIDENTIAL	3.8	2,800	N/A	10,511	3.60	37,839
OPEN SPACE	62.0		N/A	N/A	N/A	N/A
OPEN WATER			N/A	N/A	N/A	N/A
RIGHT-OF-WAY (COLLECTORS AND ARTERIALS)			N/A	N/A	N/A	N/A
PARCEL ID #2 - Defined Development	5.1		N/A	5,480	3.60	19,728
PARCEL ID #4 - Defined Development	12.1		N/A	18,017	3.60	64,863
PARCEL ID #6 - Defined Development	33.8		N/A	86,568	3.60	311,645
PARCEL ID #9 - Defined Development	7.3		N/A	7,500	3.60	27,000
PARCEL ID #10 - Defined Development	3.8		N/A	4,000	3.60	14,400
TOTAL	356.9			324,844		1,169,437

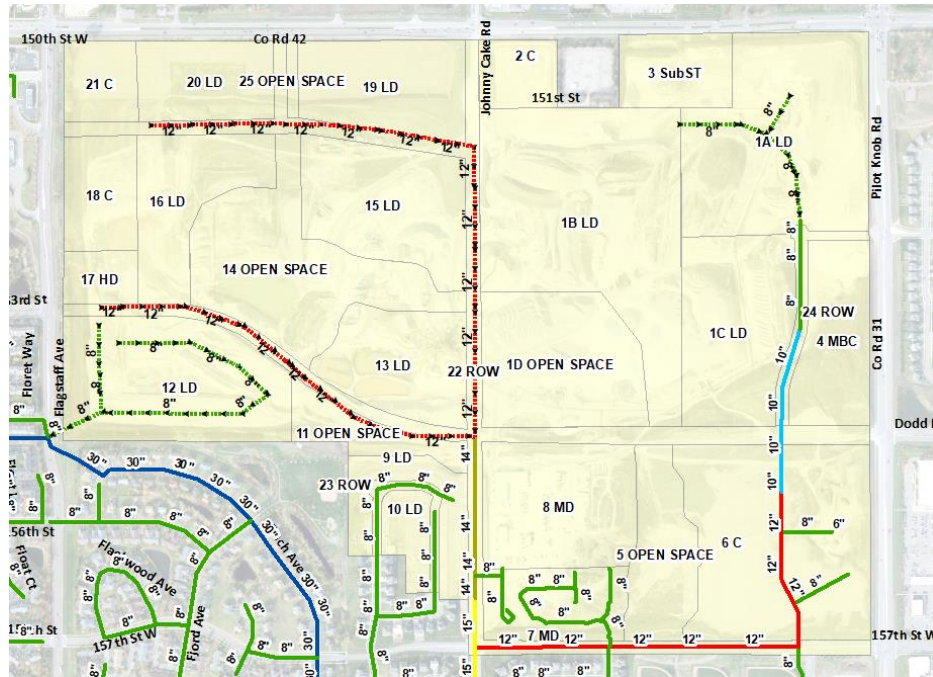


Figure 7: Layout of Scenario 6 – MBC replaced with Low Density Residential

System Analysis

Analysis was completed for the following scenarios and provide information on sewer layout and hydraulic profile for pertinent sections of sewer main. Exhibits and figures are attached that show the results of the analysis.

- Scenario 1: Comprehensive Plan 2040
- Scenario 2: Without Data Center – current landuse and layout areas
- Scenario 3: With Data Center
- Scenario 4: With Two Data Centers
- Scenario 5: MBC replaced with Medium Density Residential
- Scenario 6: MBC replaced with Low Density Residential

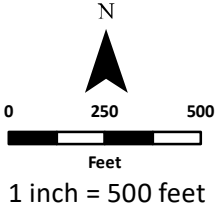
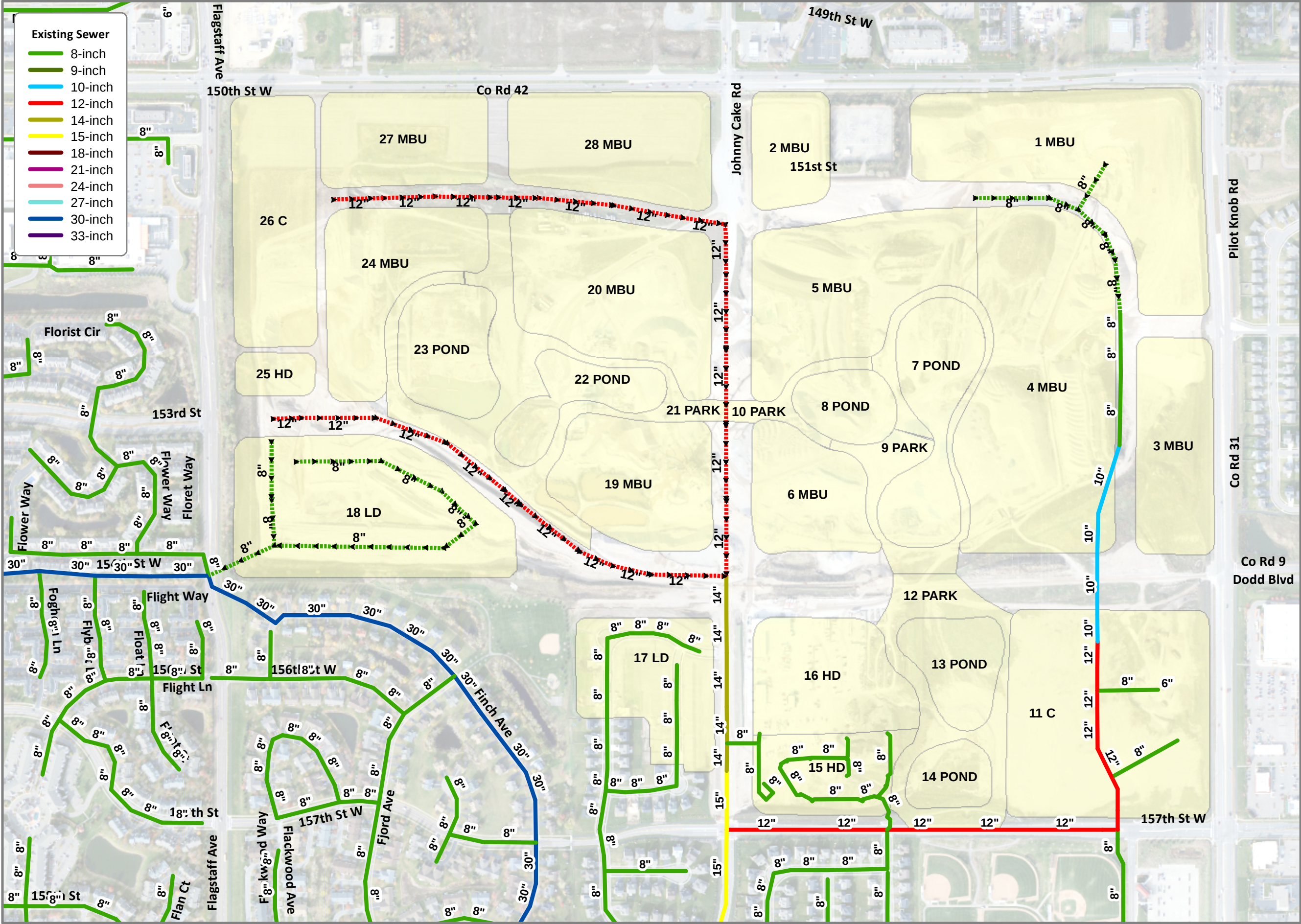


Exhibit 1

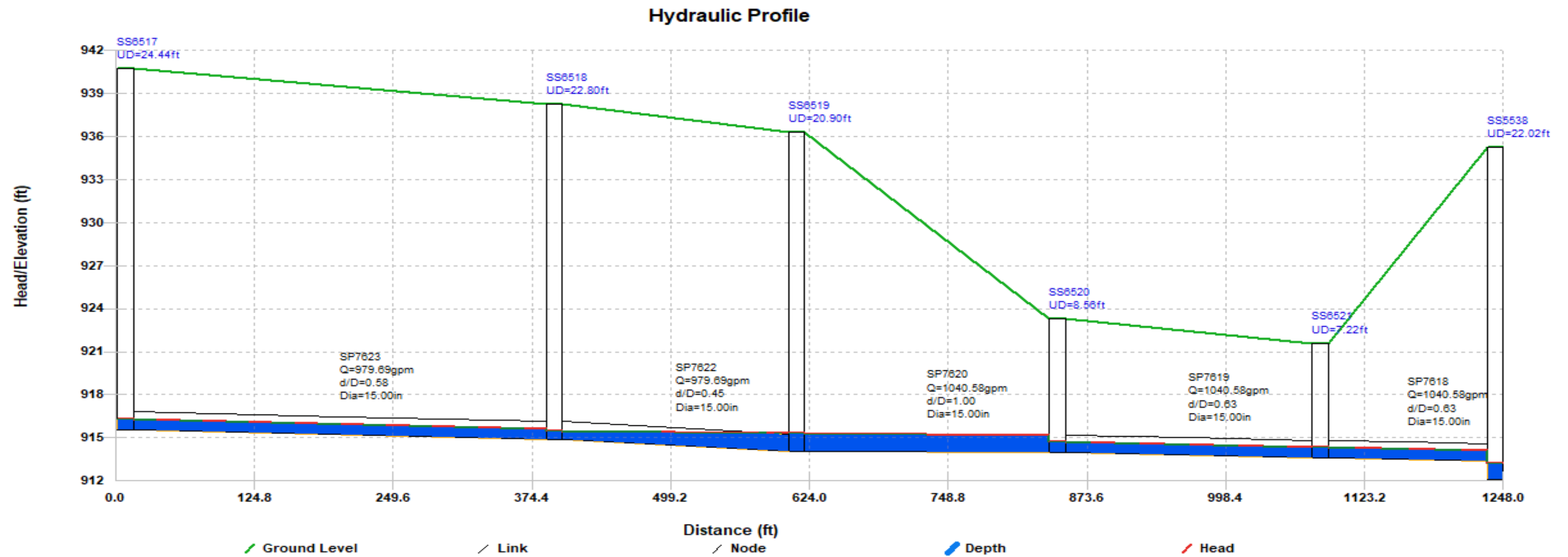
CONCEPTUAL SEWER LAYOUT

SCENARIO 1

BASED ON COMPREHENSIVE PLAN 2040

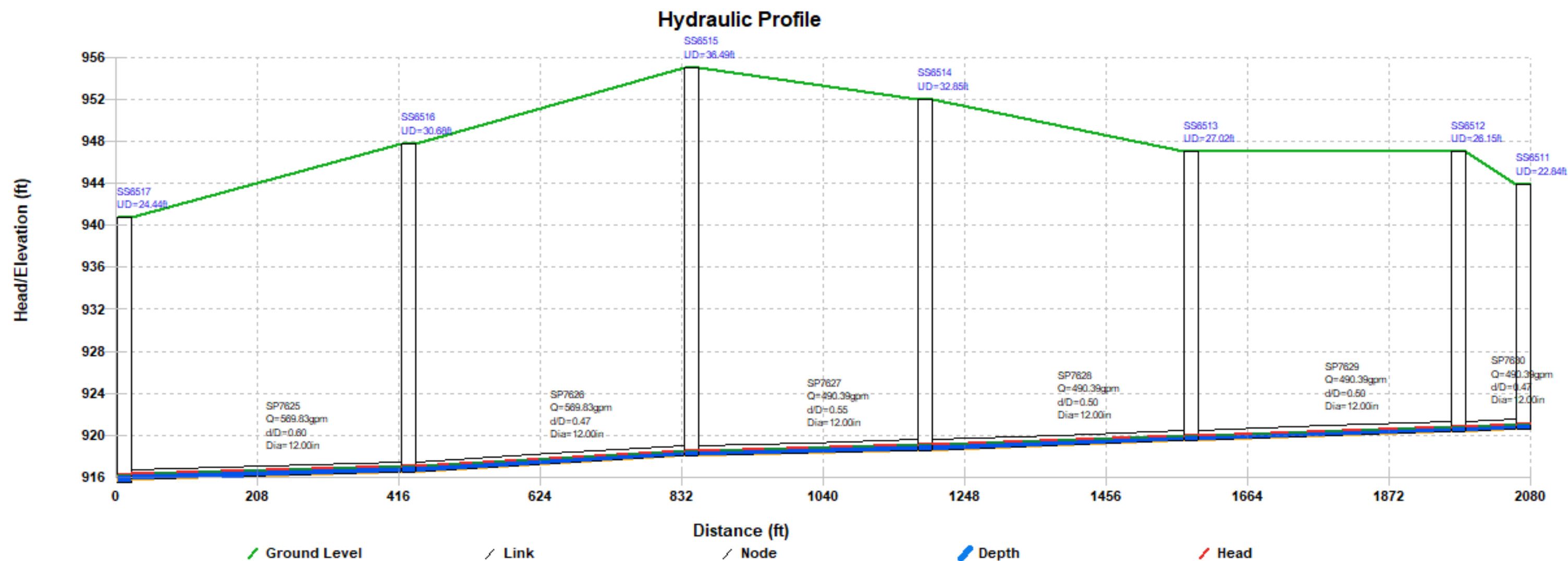
Date: 3/26/2025



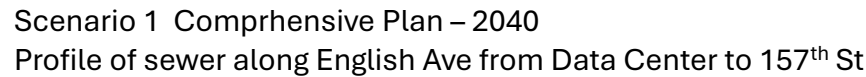


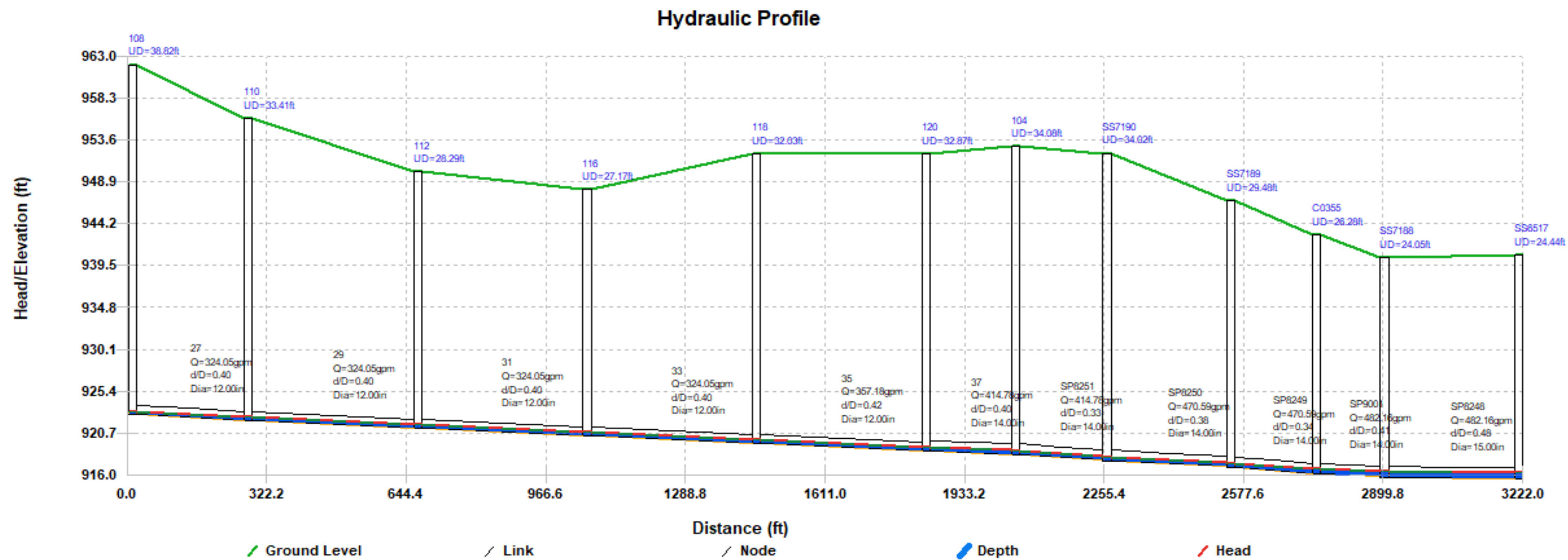
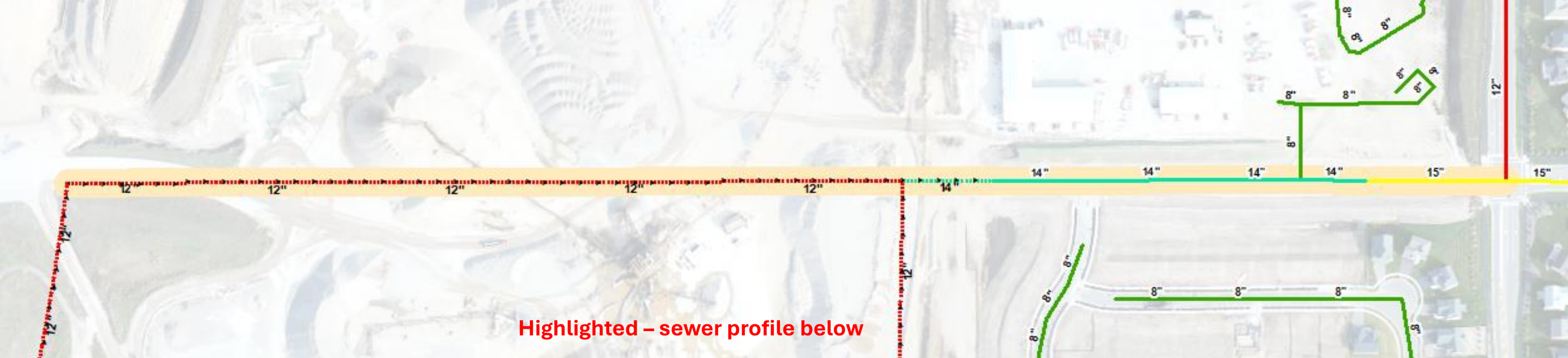


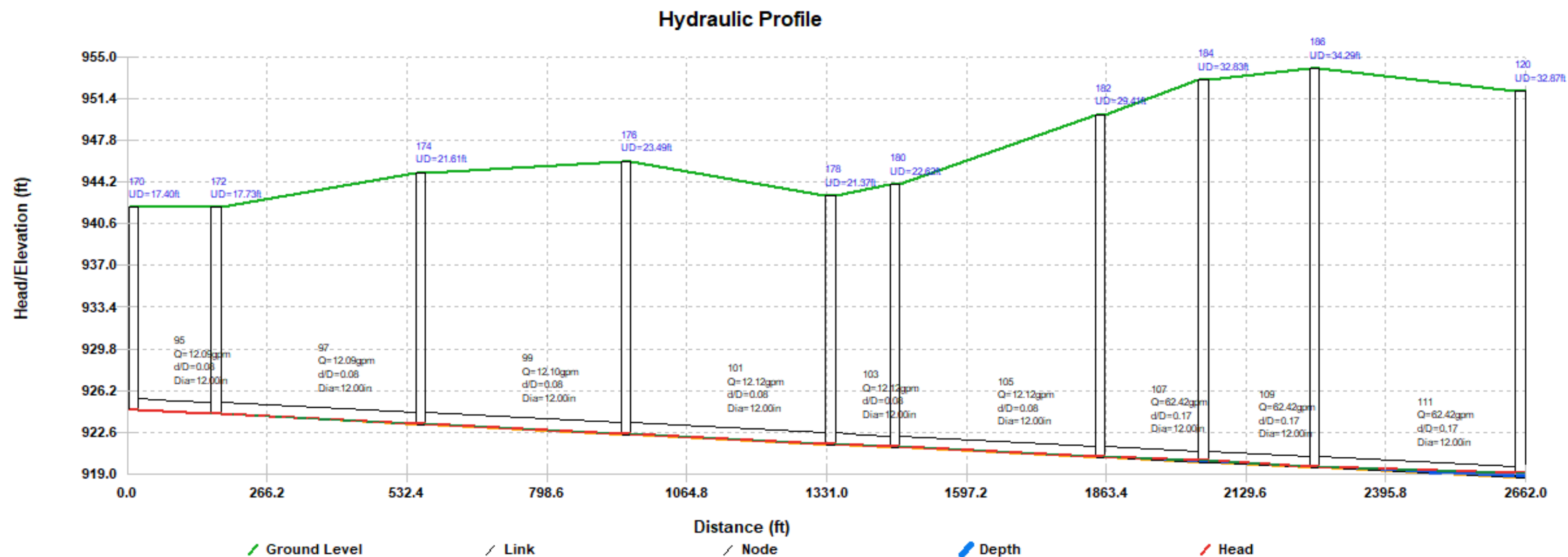
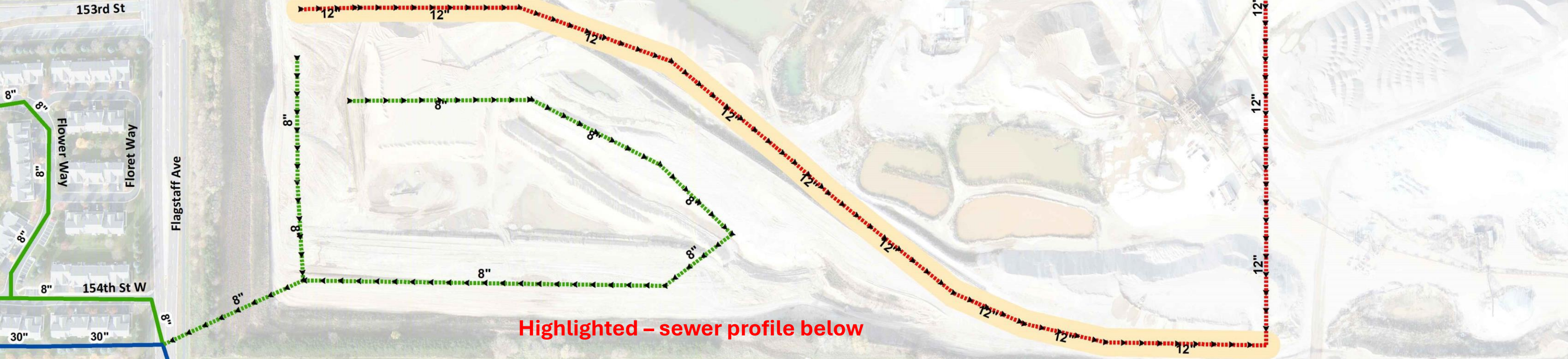
Highlighted – sewer profile below

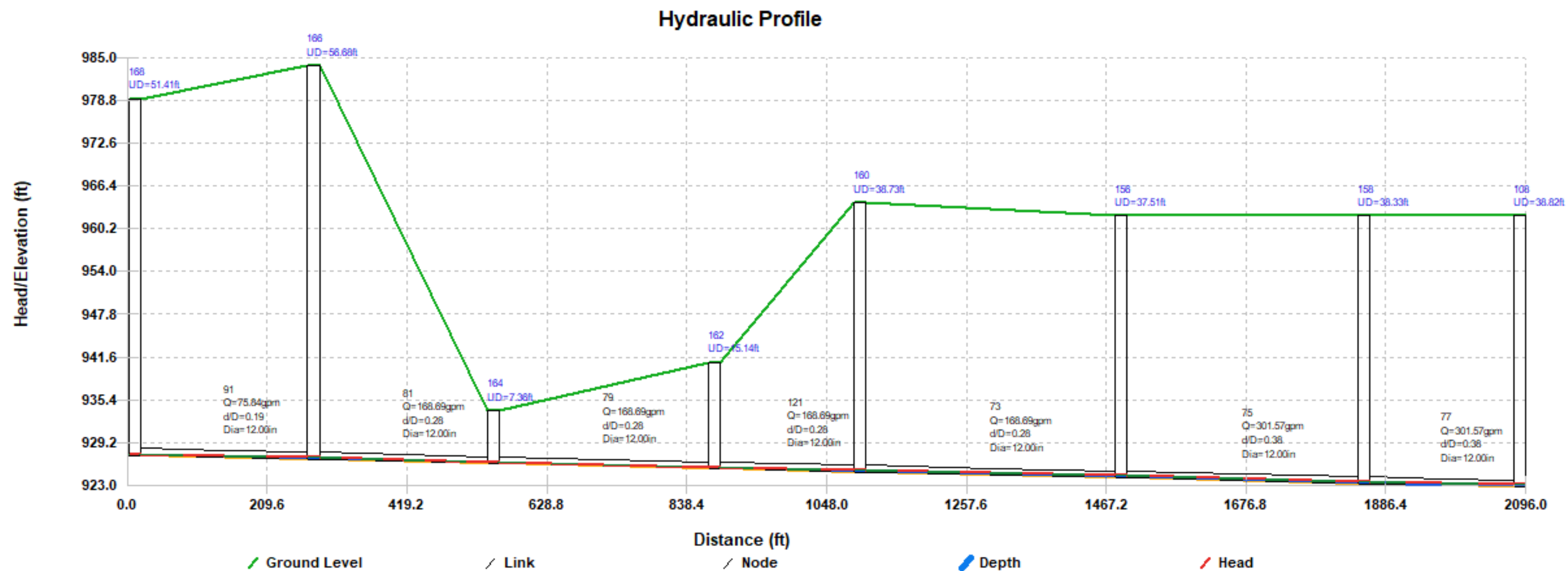
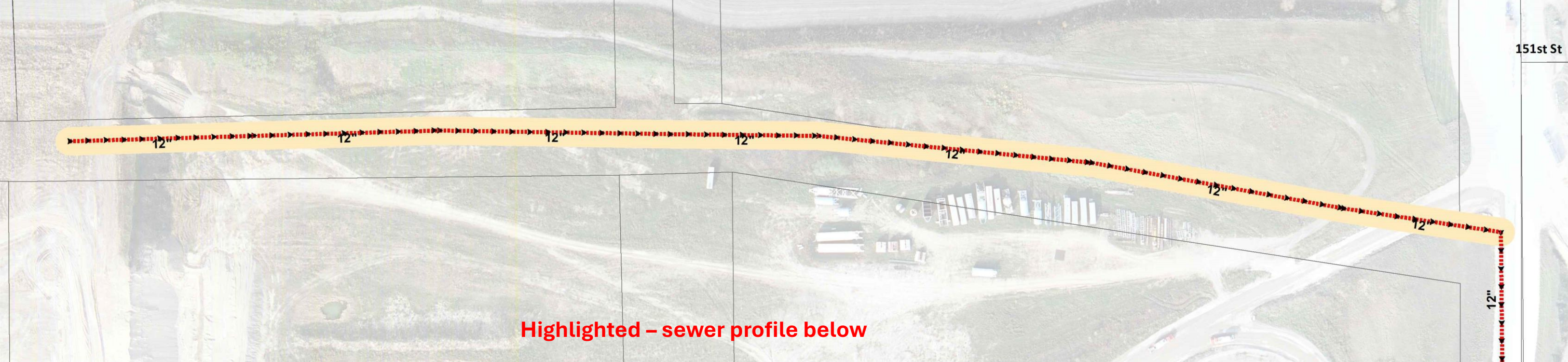


Scenario 1 Comprehensive Plan – 2040
Profile of sewer along 157th St from JCRR to English Ave









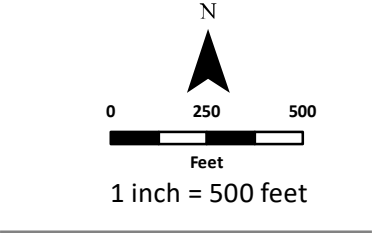
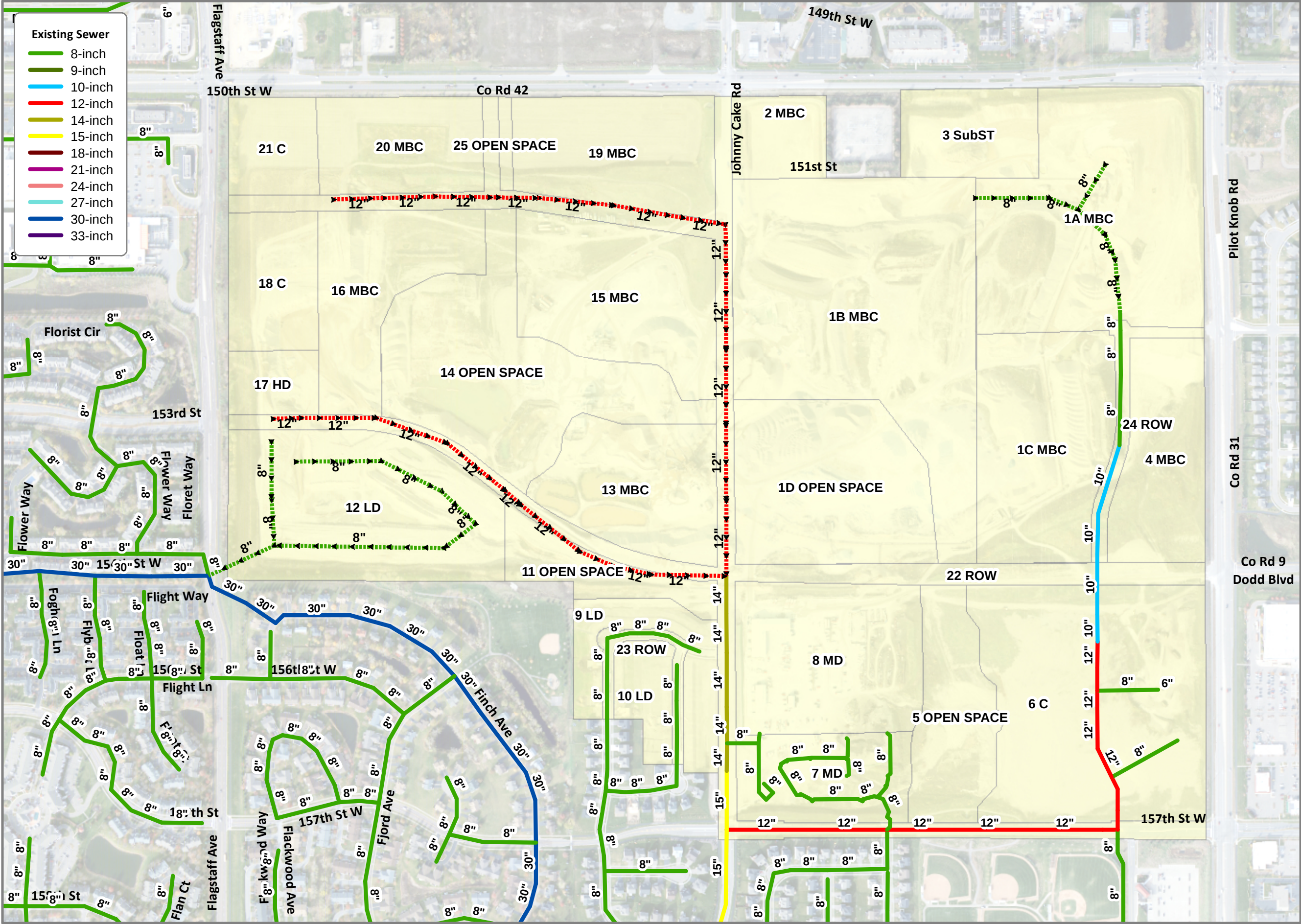


Exhibit 2

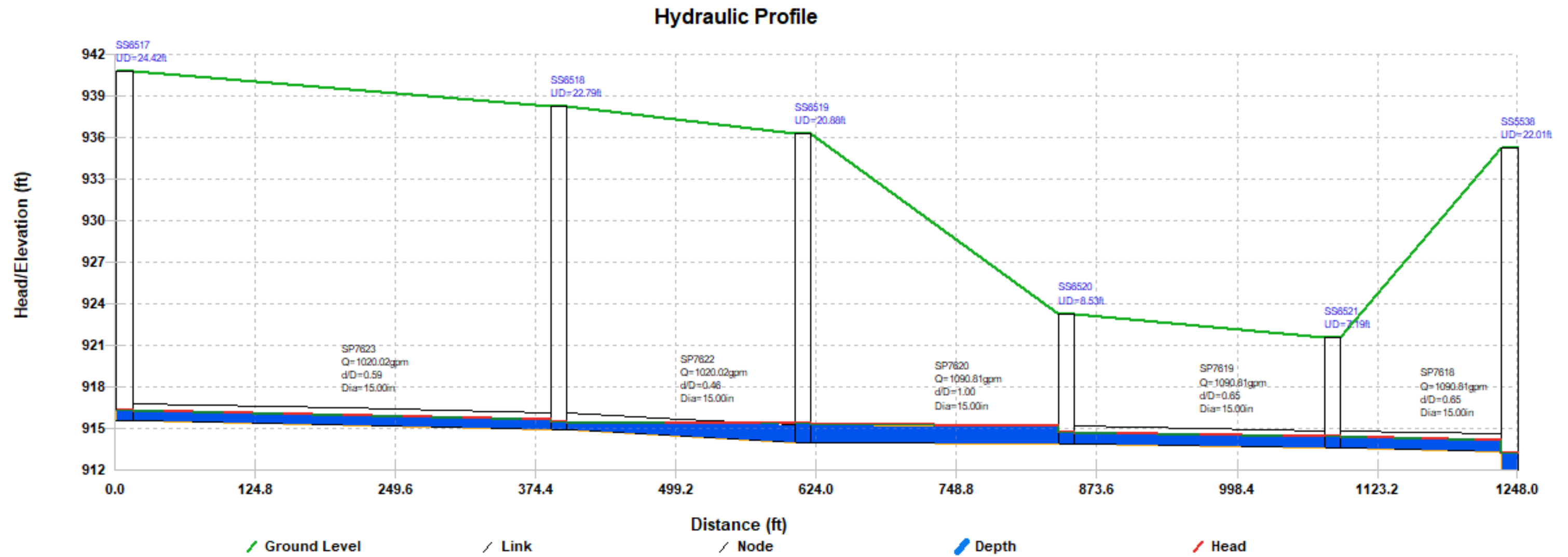
CONCEPTUAL SEWER LAYOUT

SCENARIO 2

UPDATED PLANNING WITH NO DATA CENTER

Date: 3/26/2025

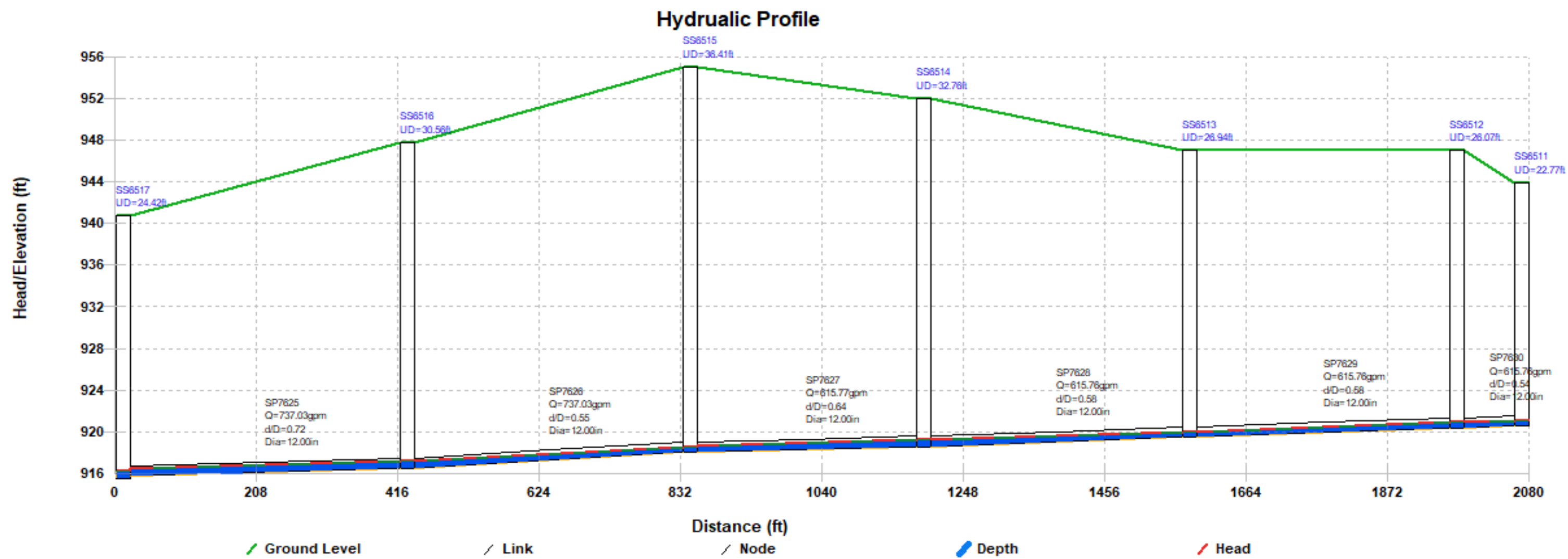




Scenario 2 Updated Planning without Data Center
Profile of sewer along JCRR from Co Rd 46 to 157th St



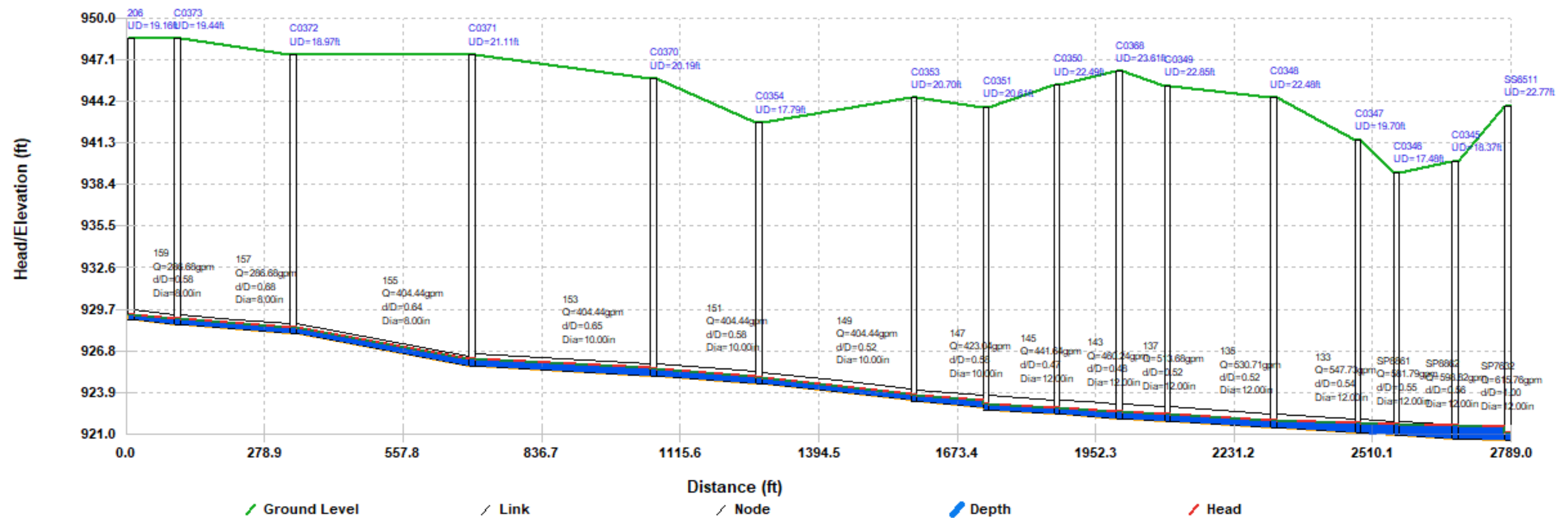
Highlighted – sewer profile below



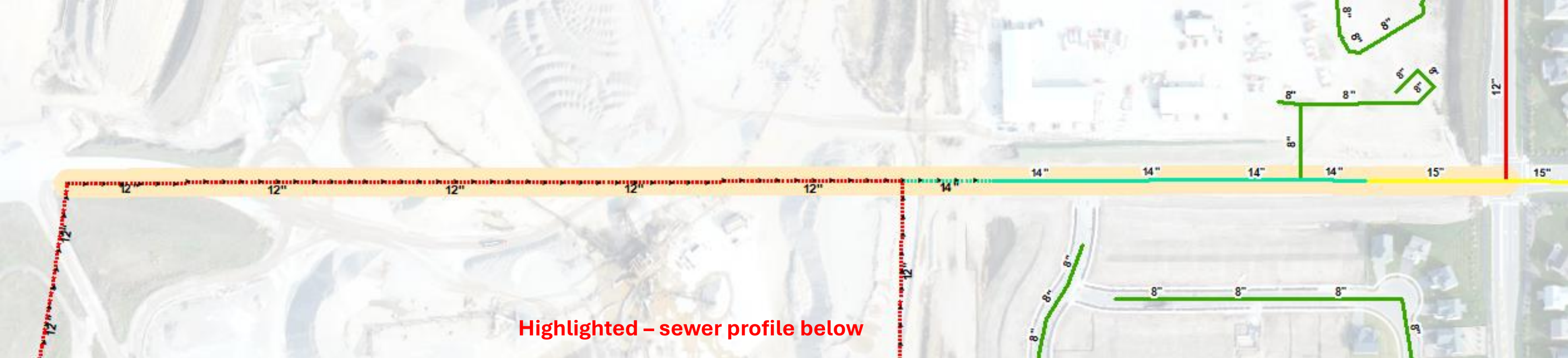
Scenario 2 Updated Planning without Data Center
Profile of sewer along 157th St from JCRR to English Ave



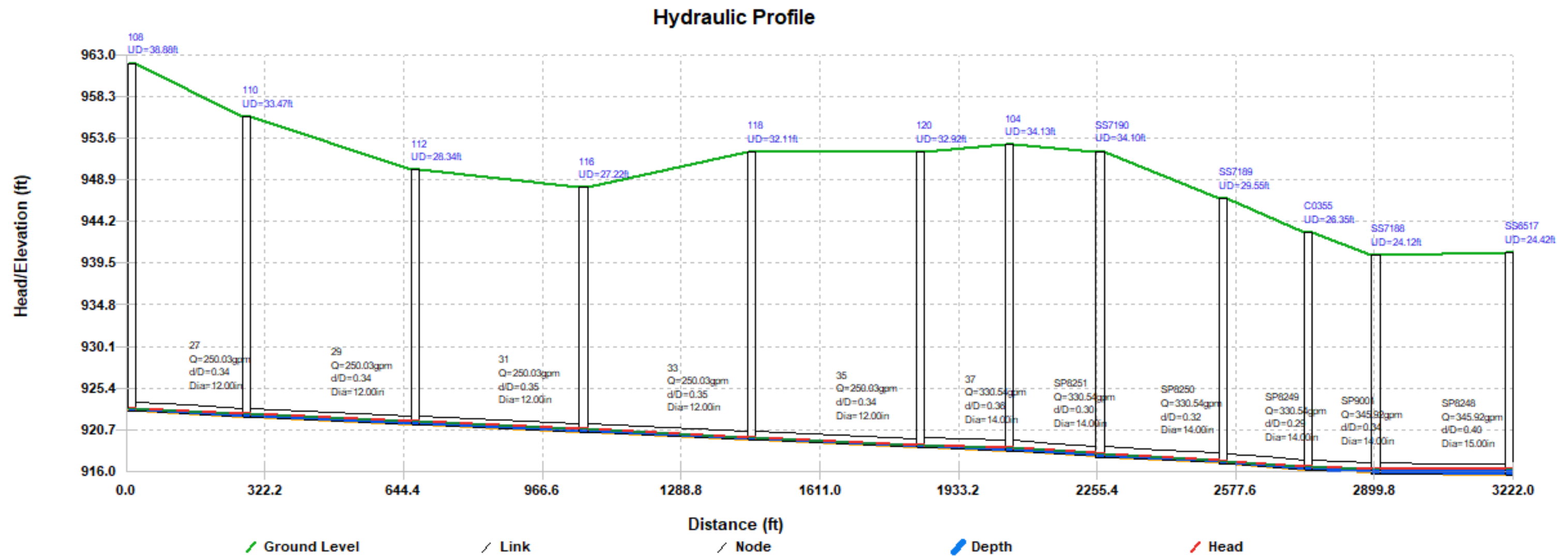
Steady-State HGL Profile of Links 159,157,....,SP7632



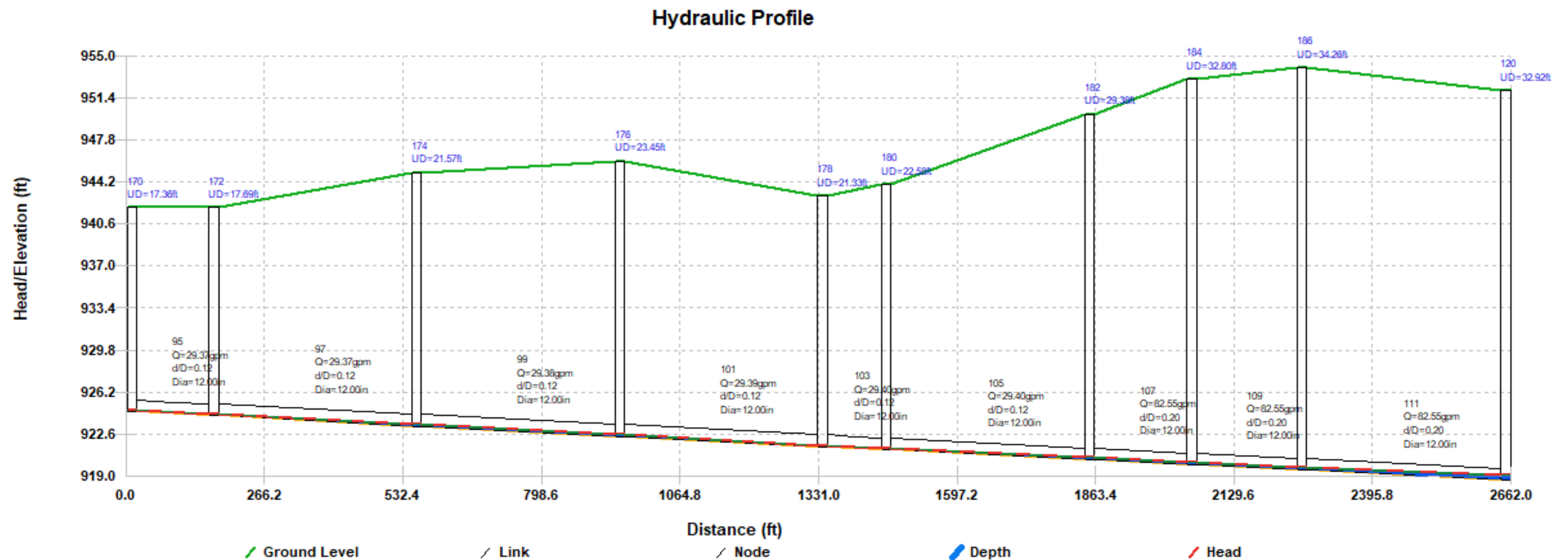
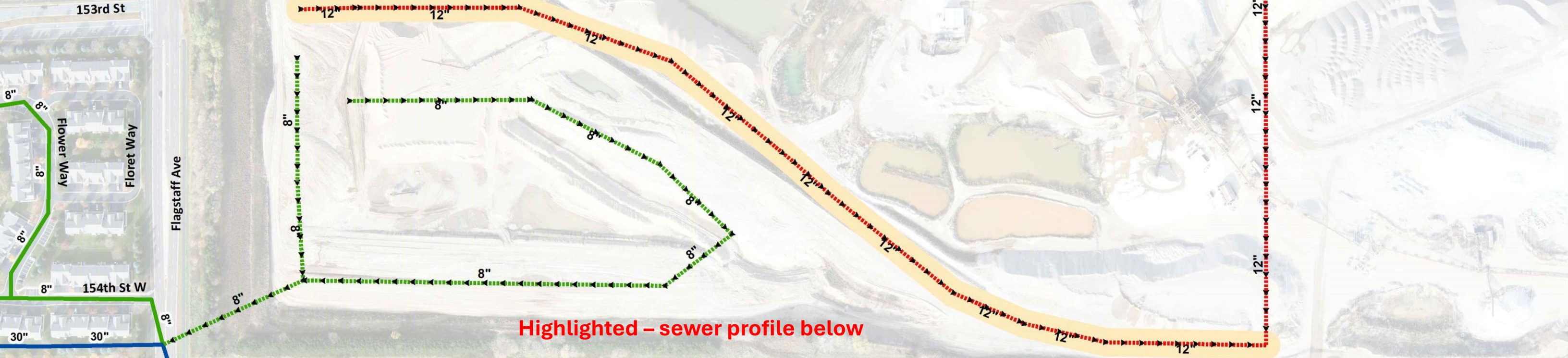
Scenario 2 Updated Planning without Data Center
 Profile of sewer along English Ave from Data Center to 157th St



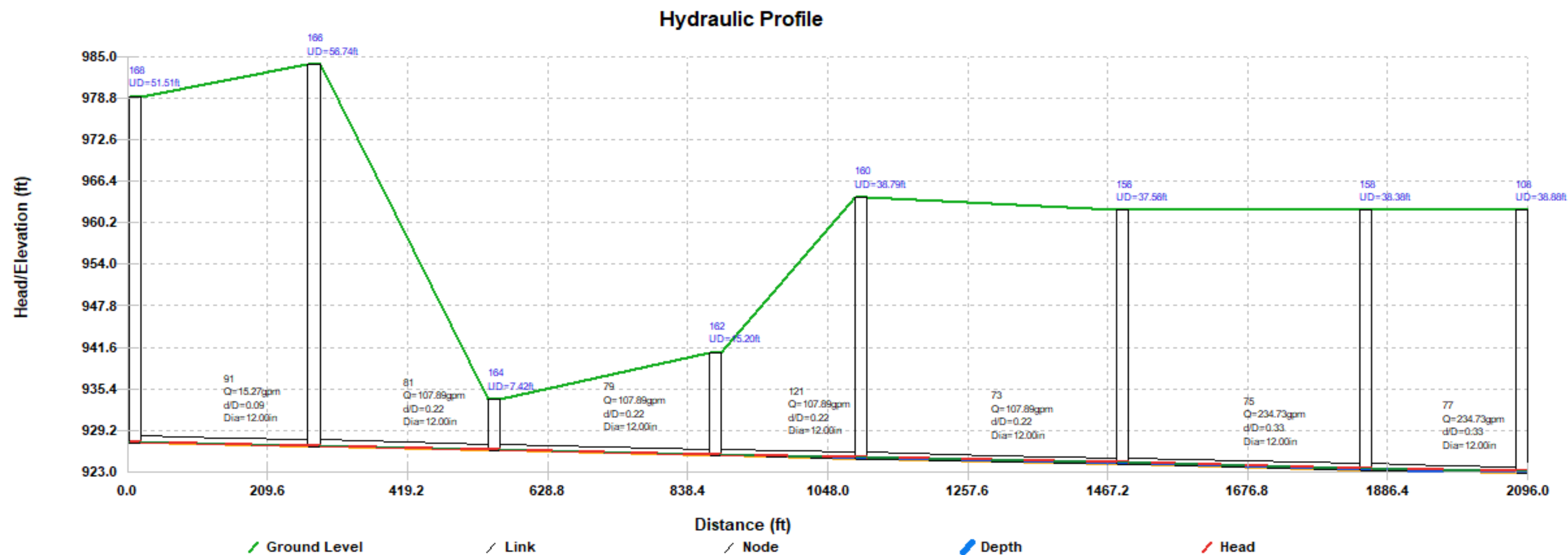
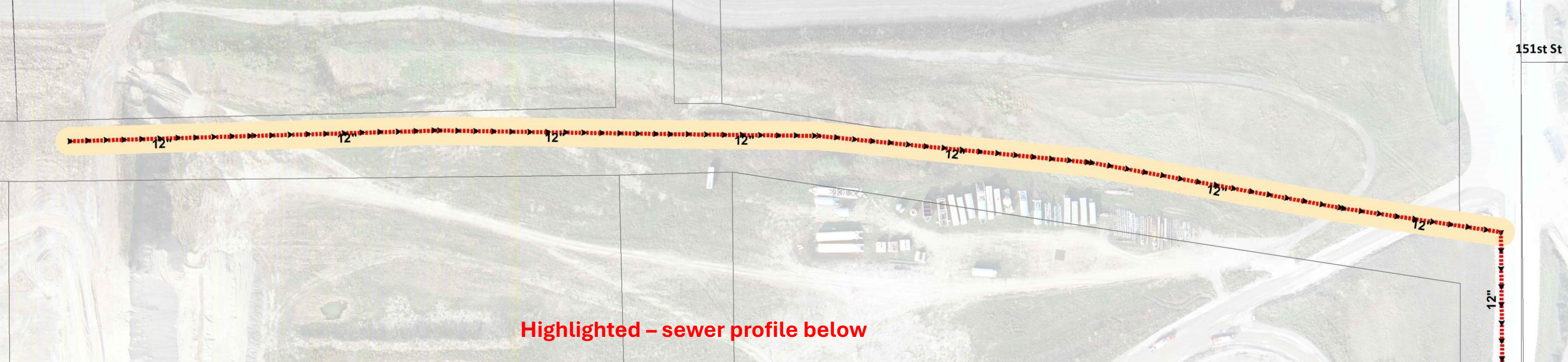
Highlighted – sewer profile below



Scenario 2 Updated Planning without Data Center
Profile of sewer along JCRR from Data Center to 157th St



Scenario 2 Updated Planning without Data Center
Profile of sewer along 153rd St from Flagstaff Ave to JCRR



Scenario 2 Updated Planning without Data Center
Profile of sewer along 151st St from Flagstaff Ave to JCRR

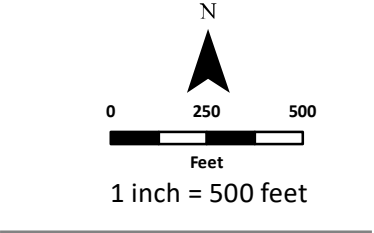
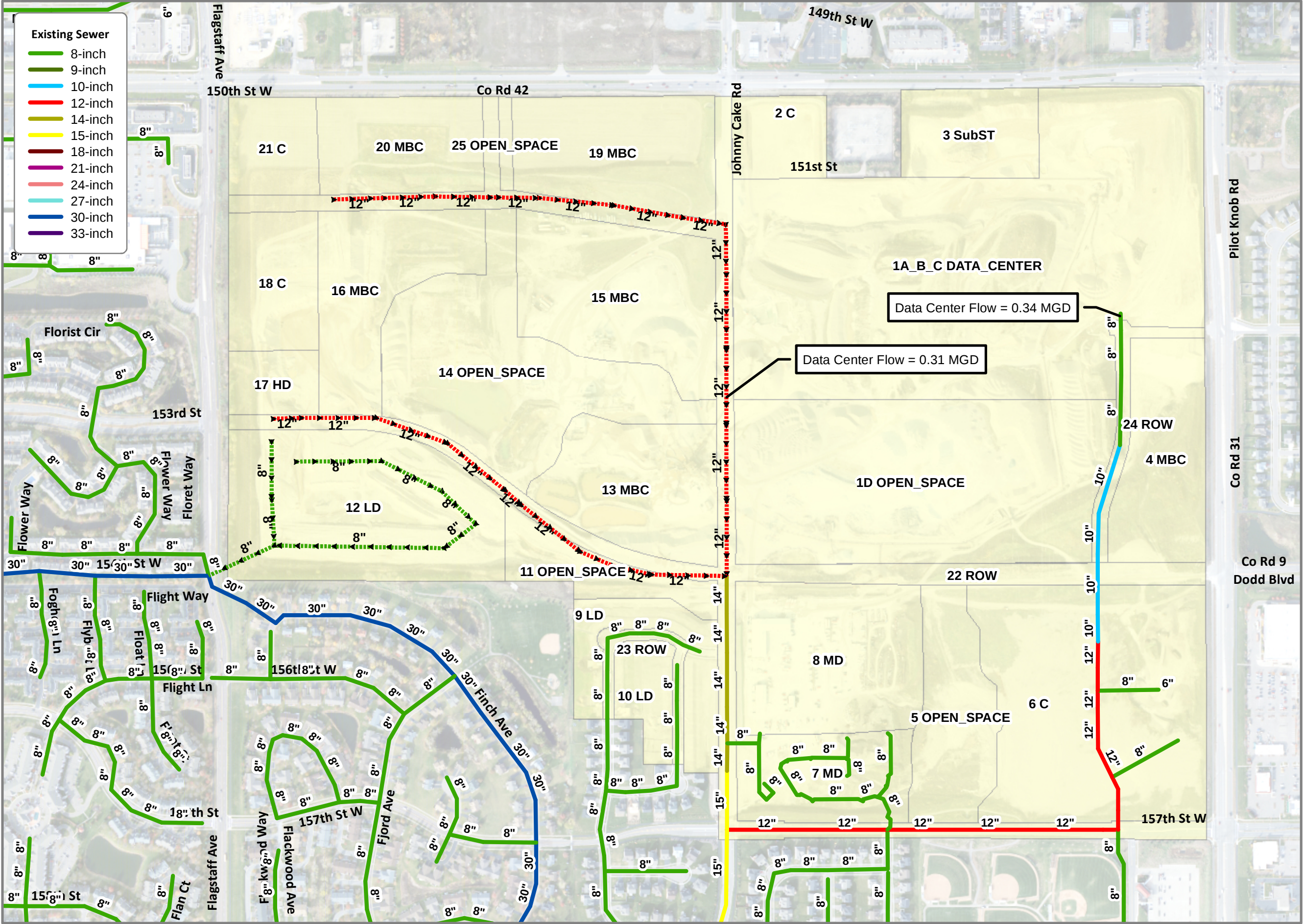
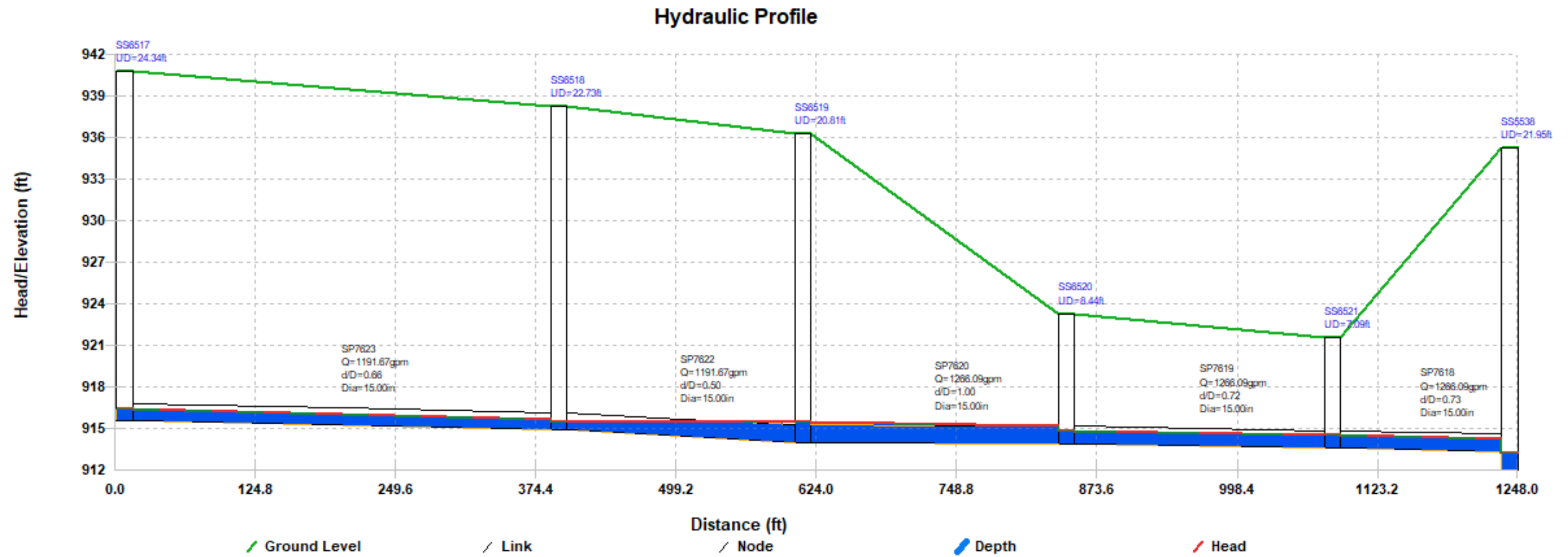


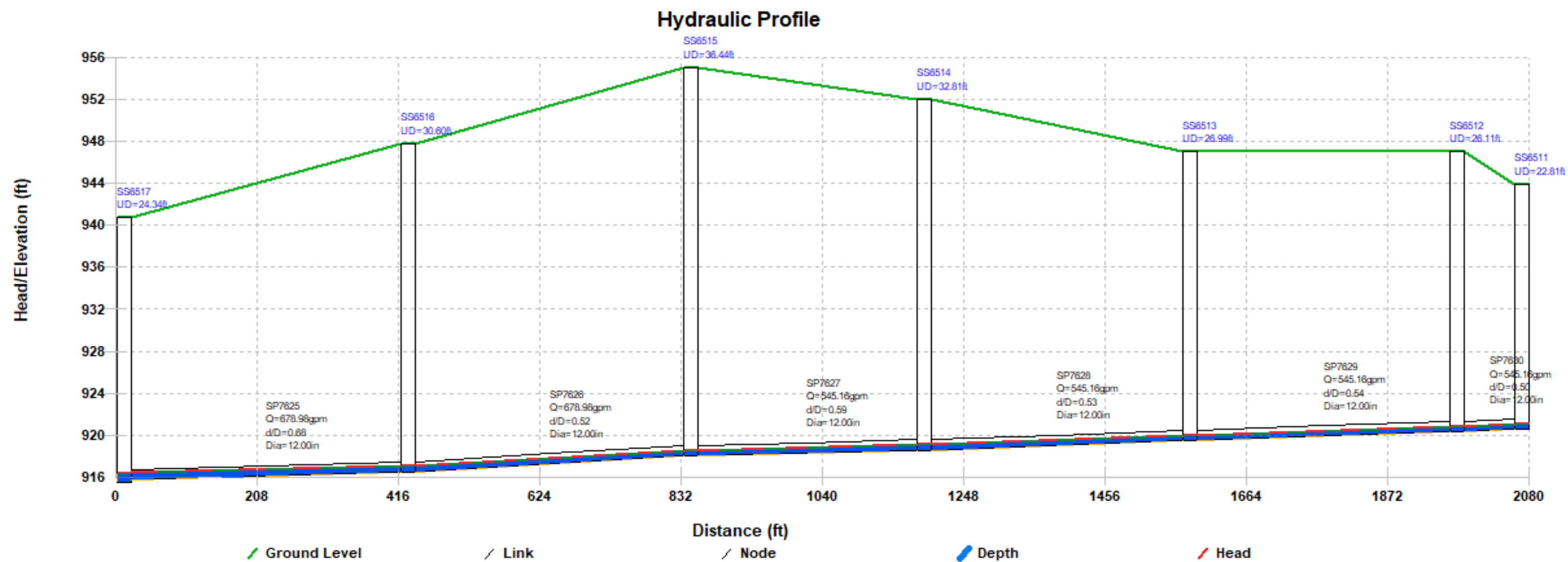
Exhibit 3
**CONCEPTUAL SEWER
LAYOUT**
SCENARIO 3
**UPDATED PLANNING
WITH DATA CENTER**

Date: 3/26/2025

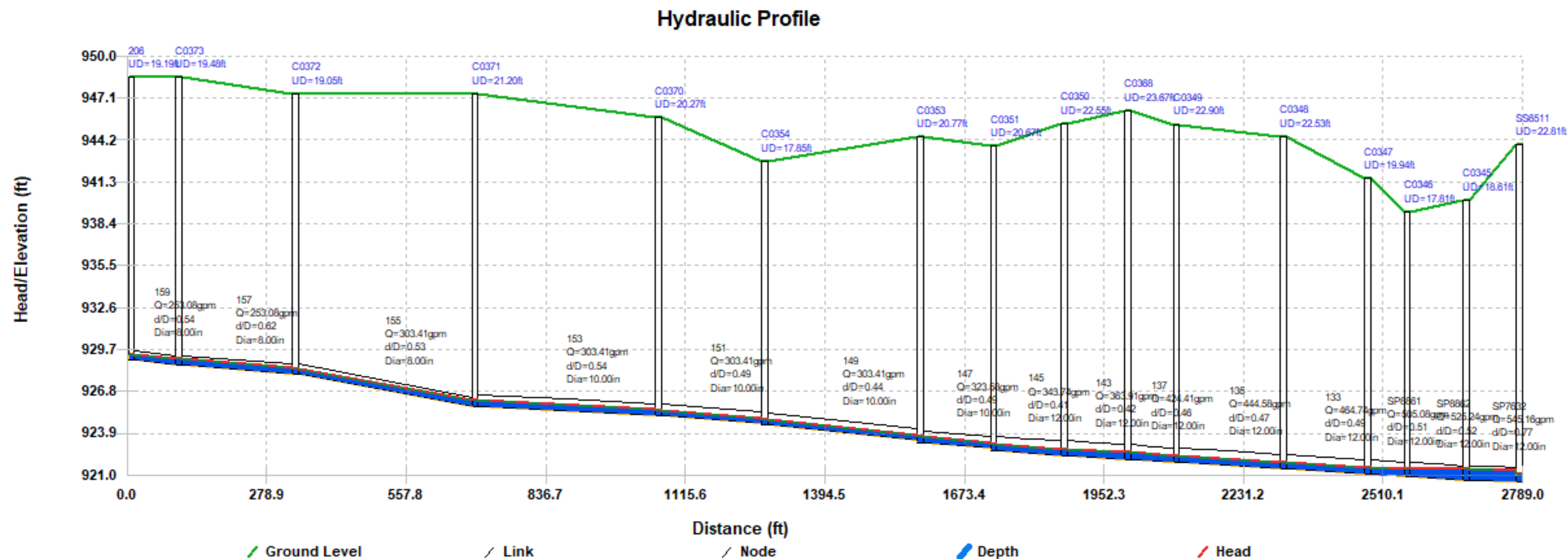




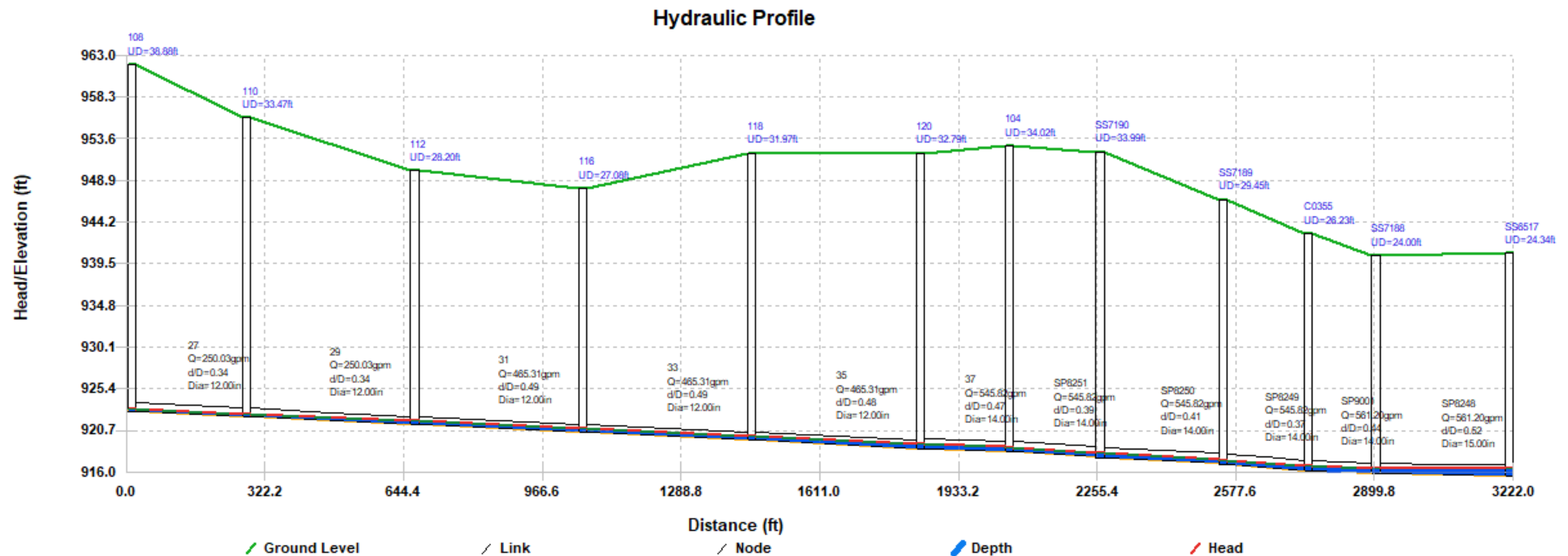
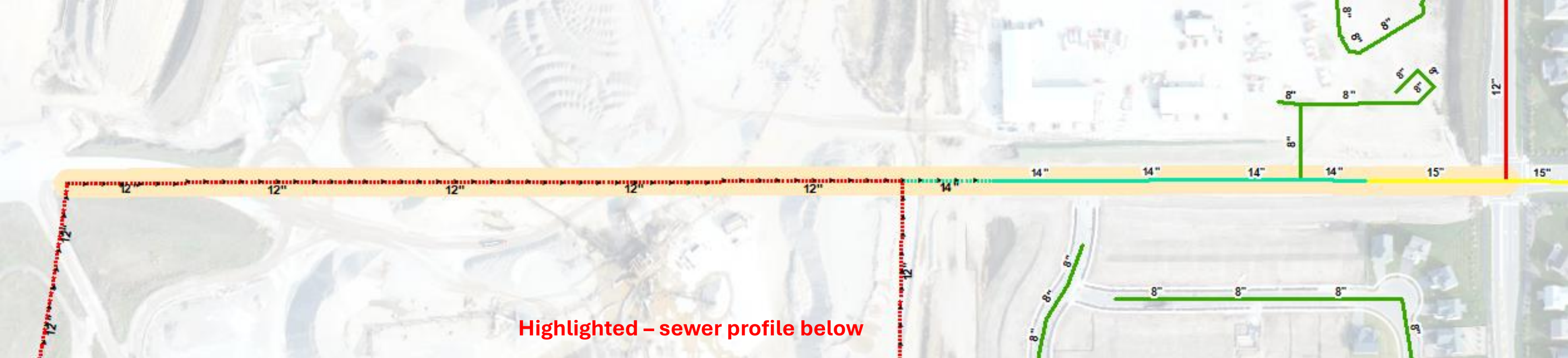
Scenario 3 Updated Planning with Data Center
Profile of sewer along JCRR from Co Rd 46 to 157th St



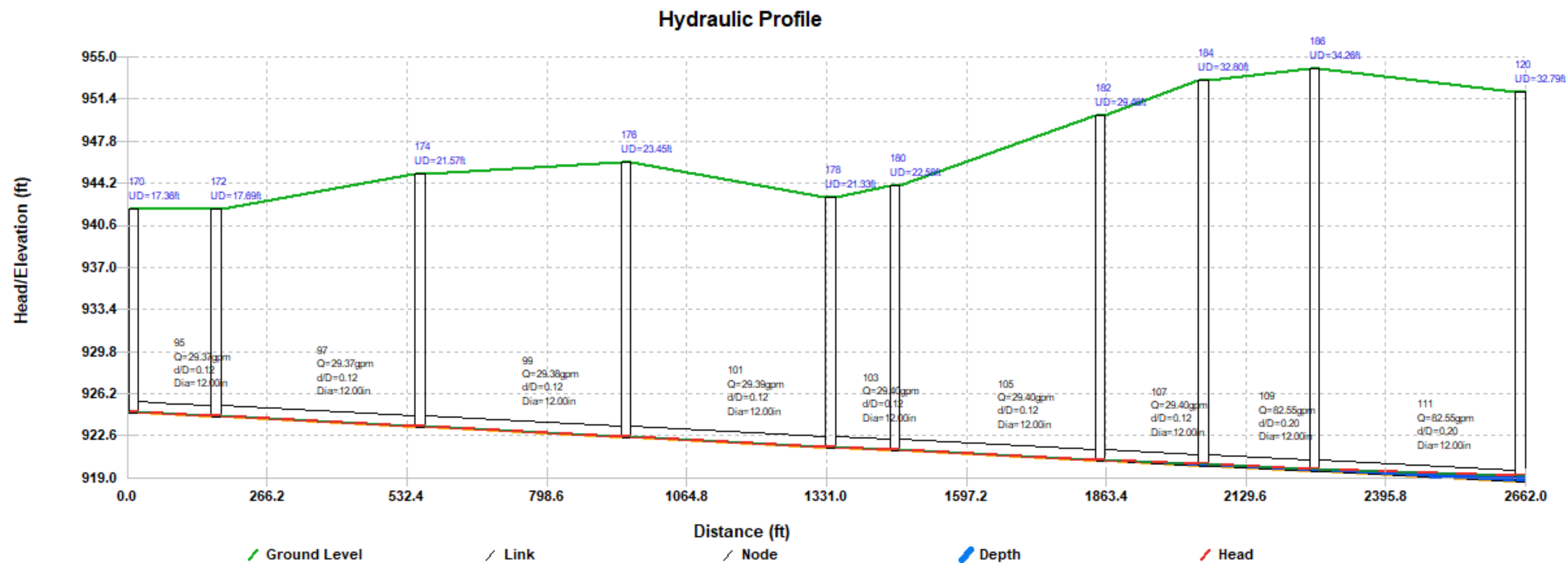
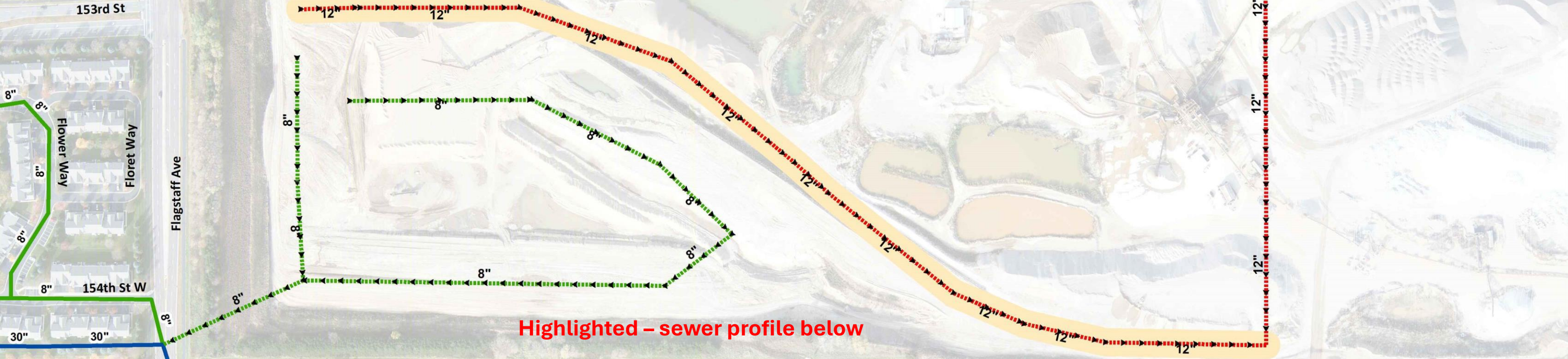
Scenario 3 Updated Planning with Data Center
 Profile of sewer along 157th St from JCRR to English Ave



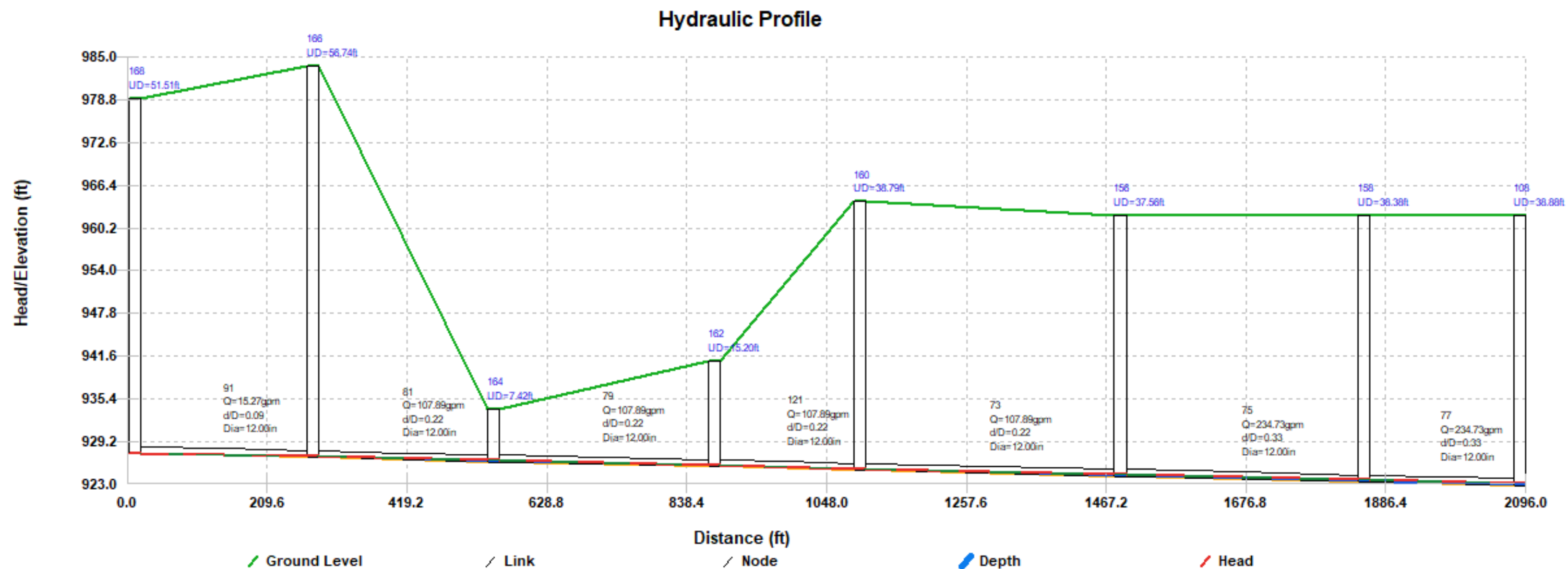
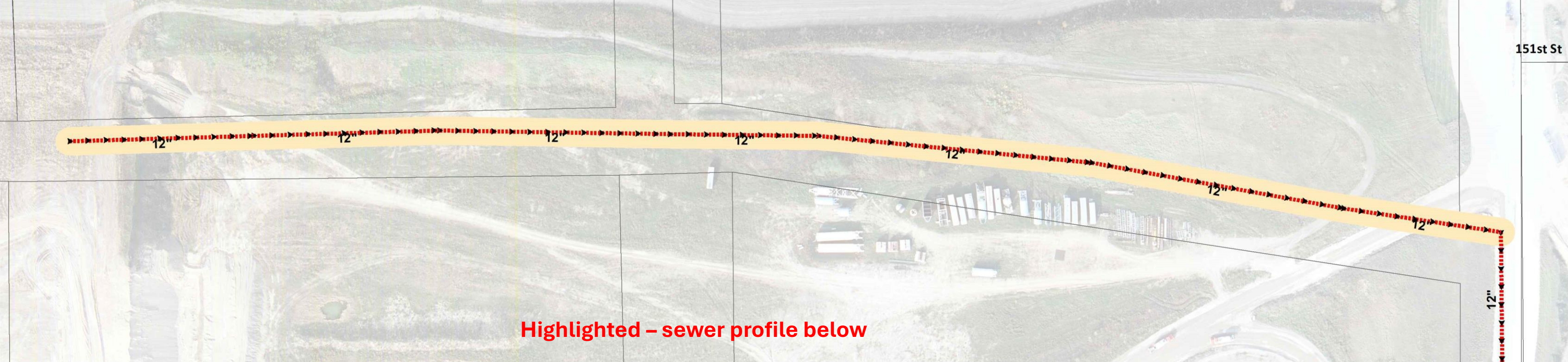
Scenario 3 Updated Planning with Data Center
Profile of sewer along English Ave from Data Center to 157th St



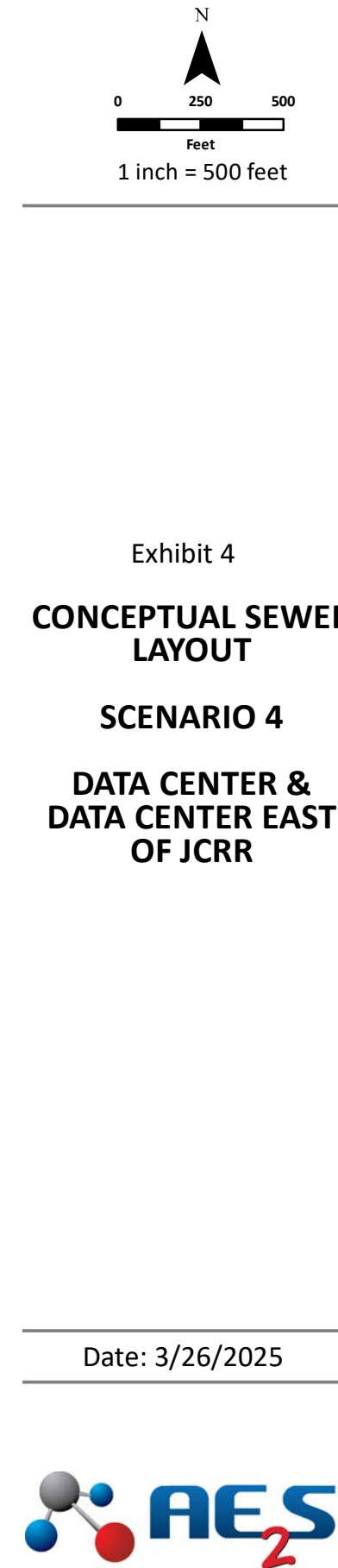
Scenario 3 Updated Planning with Data Center
Profile of sewer along JCRR from Data Center to 157th St

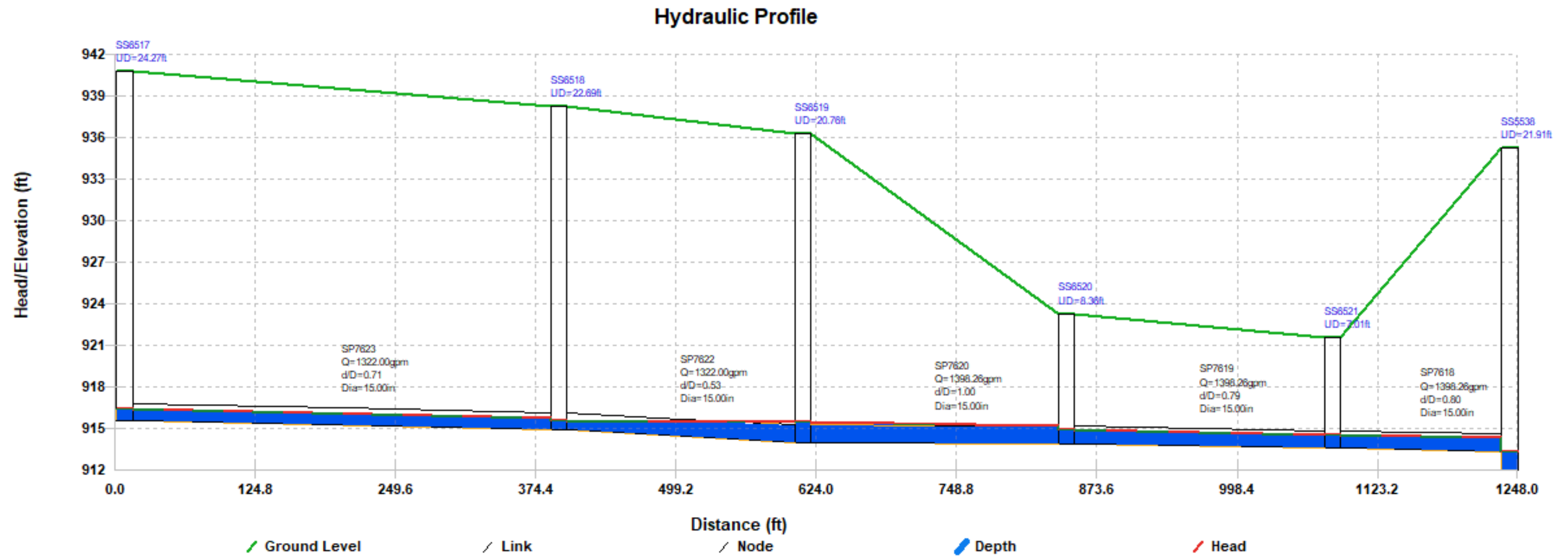


Scenario 3 Updated Planning with Data Center
Profile of sewer along 153rd St from Flagstaff Ave to JCRR

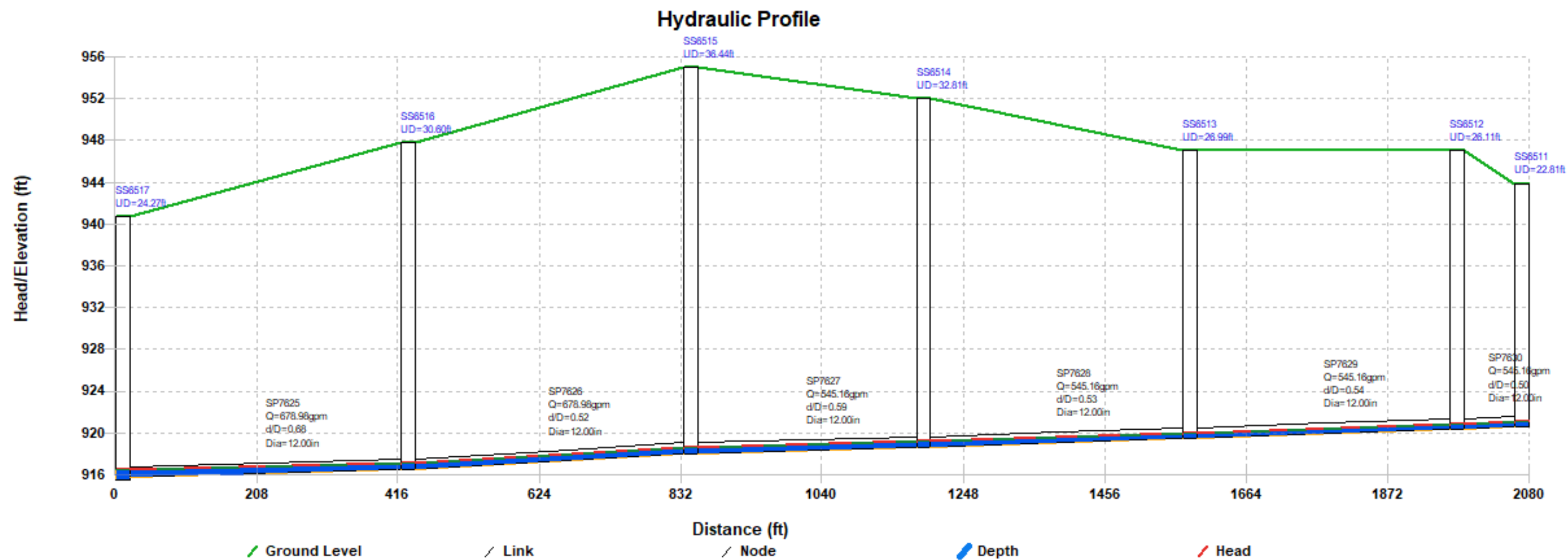


Scenario 3 Updated Planning with Data Center
Profile of sewer along 151st St from Flagstaff Ave to JCRR

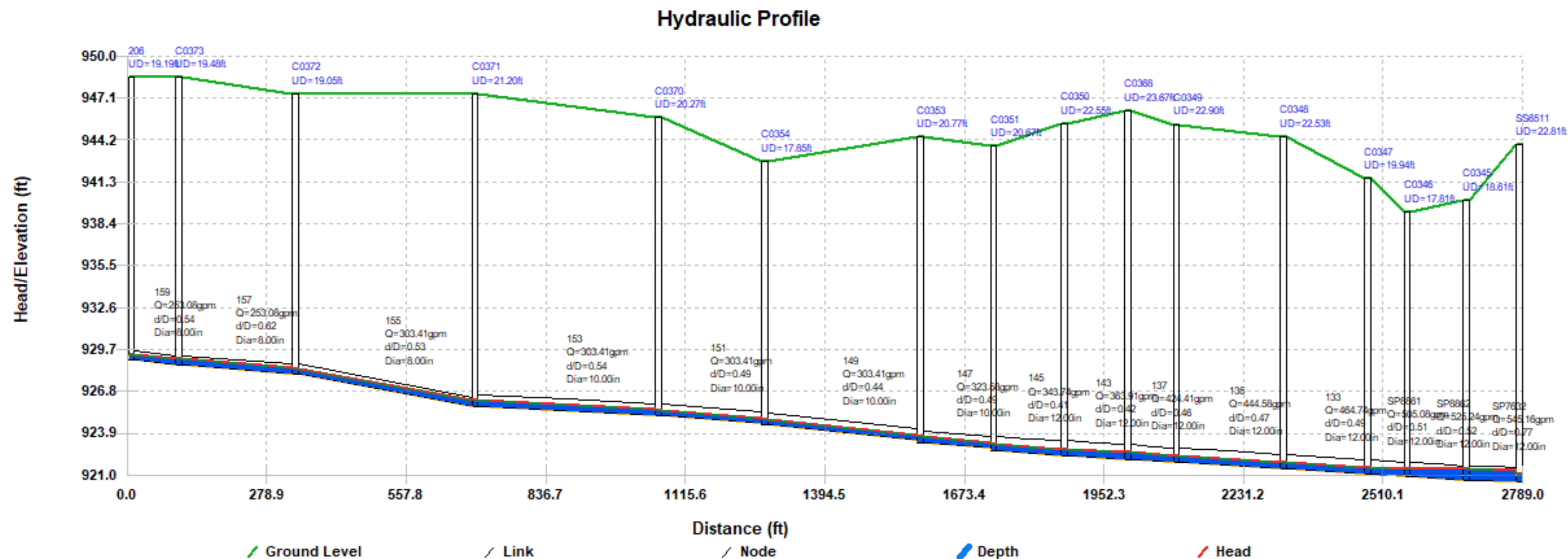




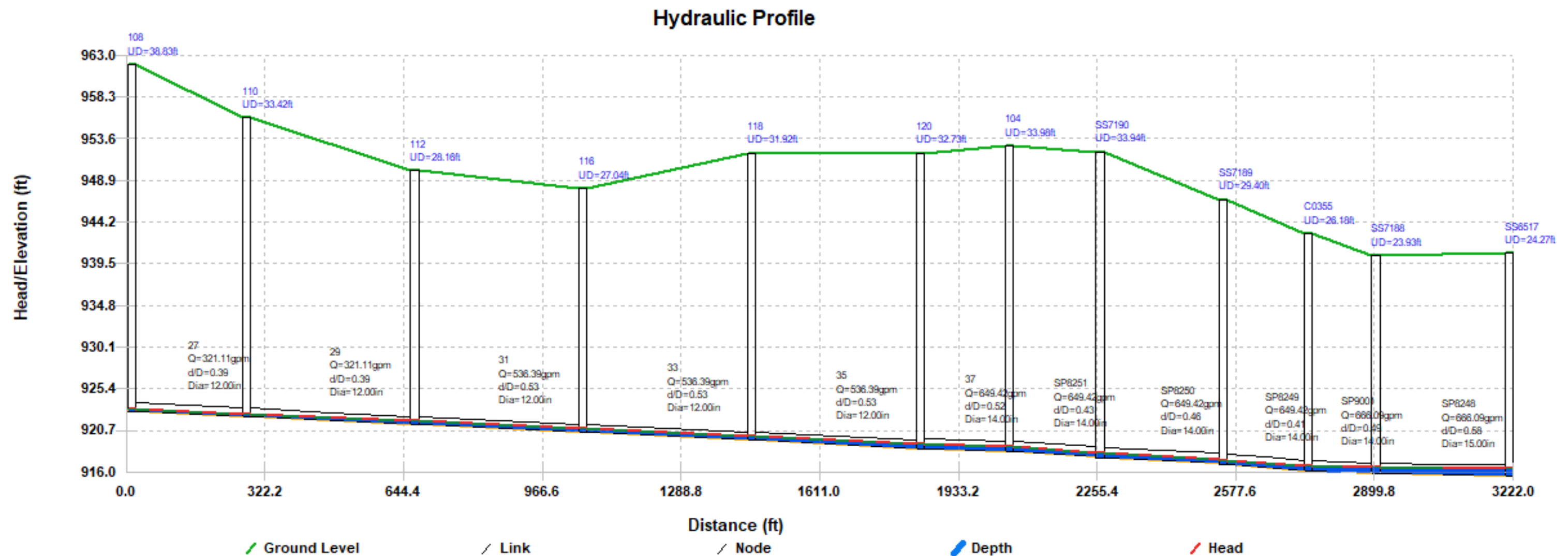
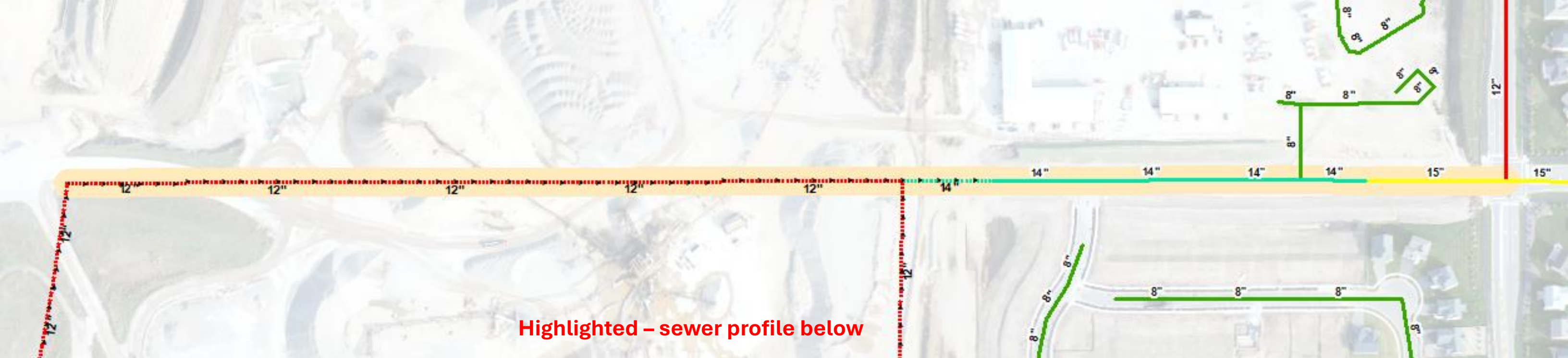
Scenario 4 Data Center and Data Center east of JCRR
Profile of sewer along JCRR from Co Rd 46 to 157th St



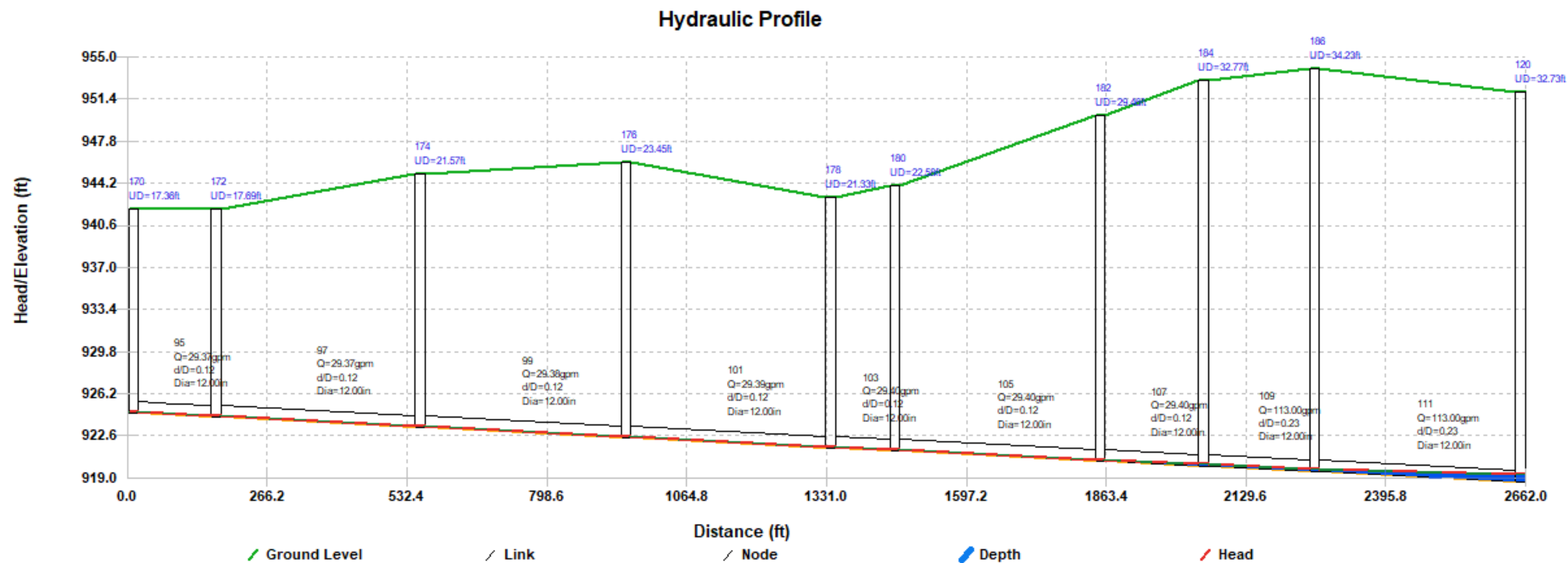
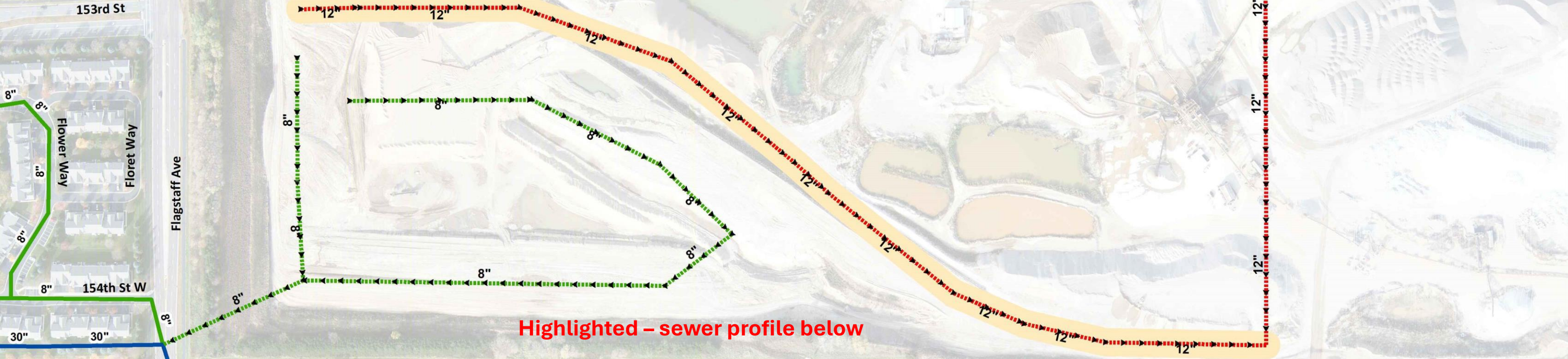
Scenario 4 Data Center and Data Center east of JCRR
 Profile of sewer along 157th St from JCRR to English Ave



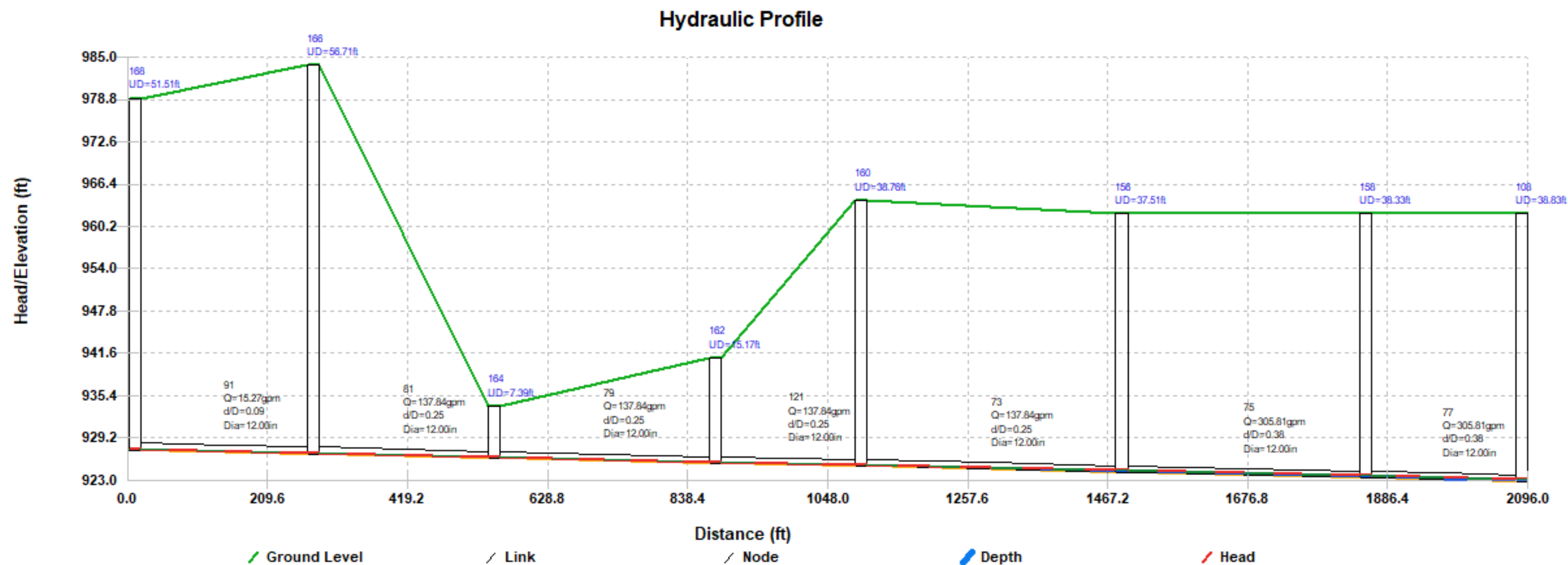
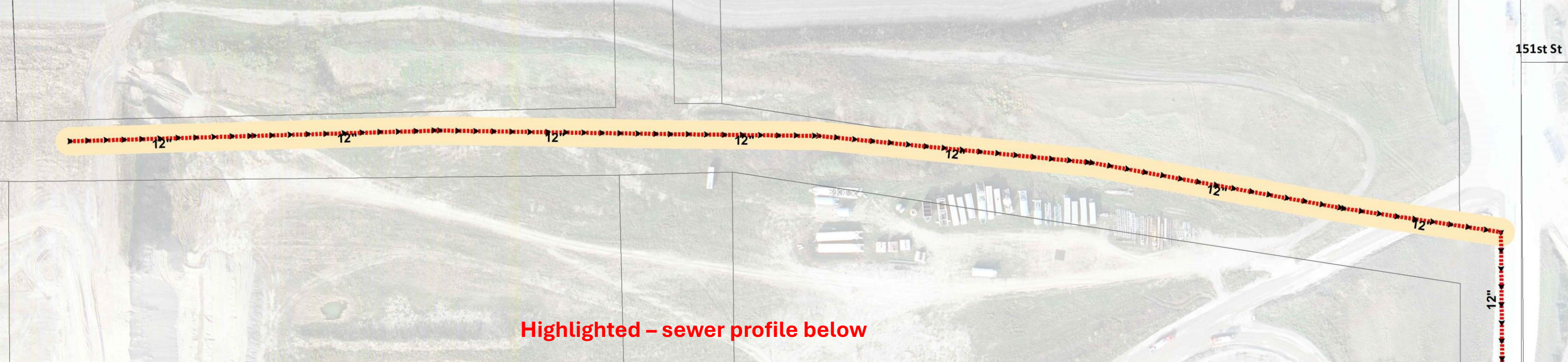
Scenario 4 Data Center and Data Center east of JCRR
Profile of sewer along English Ave from Data Center to 157th St



Scenario 4 Data Center and Data Center east of JCRR
Profile of sewer along JCRR from Data Center to 157th St



Scenario 4 Data Center and Data Center east of JCRR
Profile of sewer along 153rd St from Flagstaff Ave to JCRR



Scenario 4 Data Center and Data Center east of JCRR
Profile of sewer along 151st St from Flagstaff Ave to JCRR

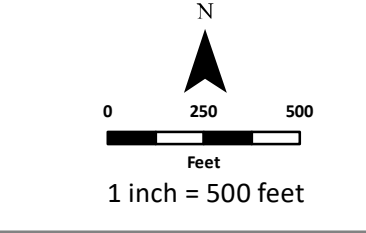
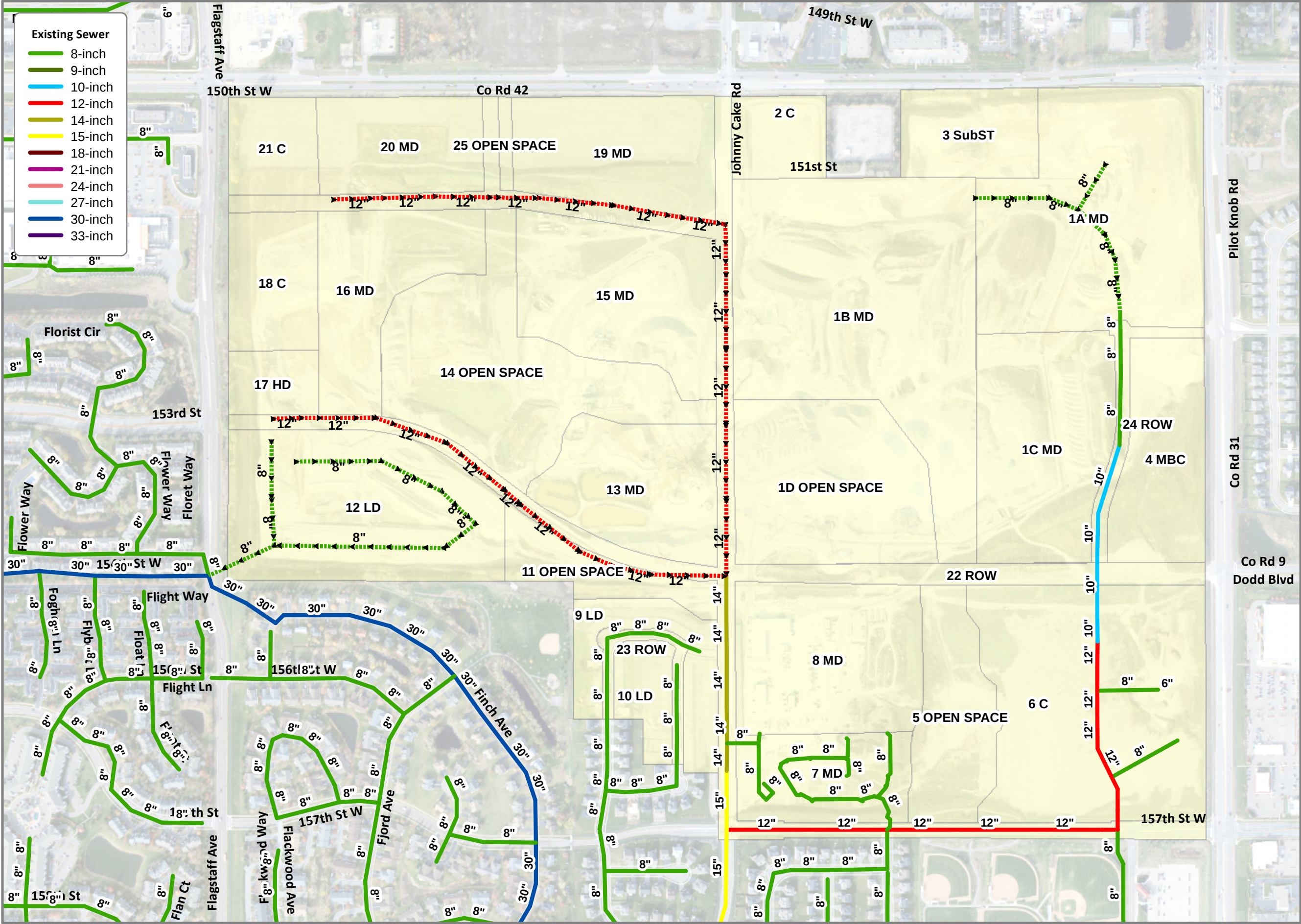


Exhibit 5

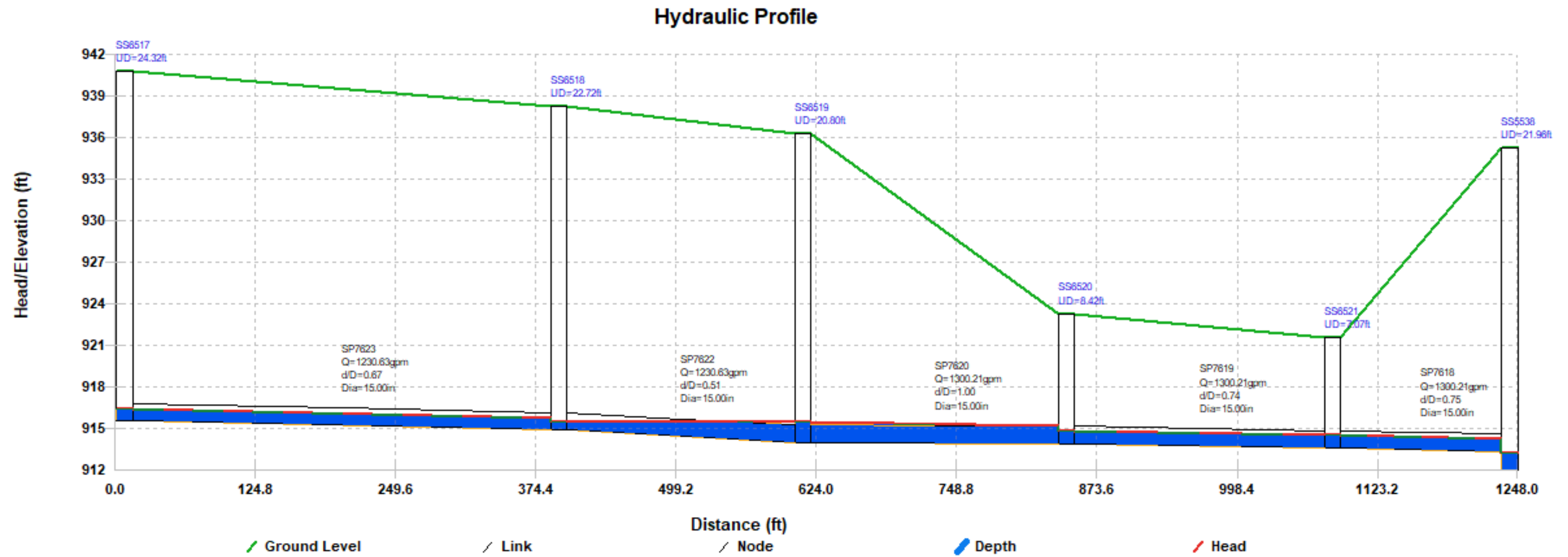
CONCEPTUAL SEWER LAYOUT

SCENARIO 5

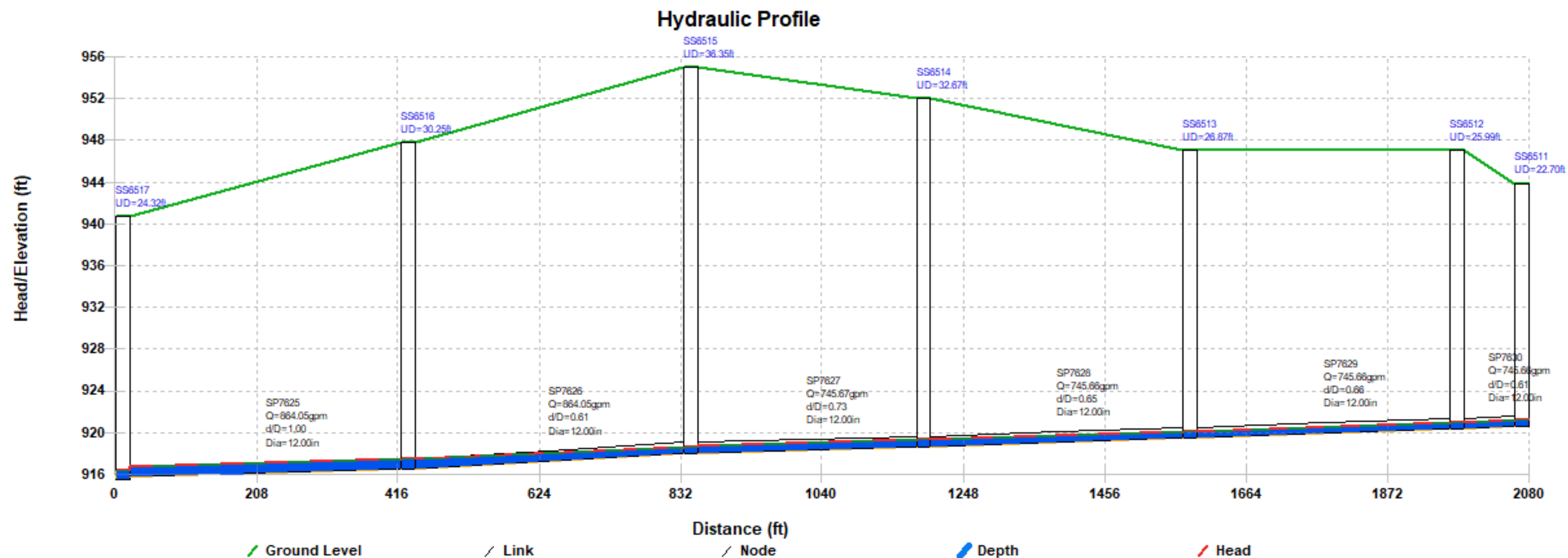
MBC REPLACED WITH MEDIUM DENSITY RESIDENTIAL

Date: 3/26/2025

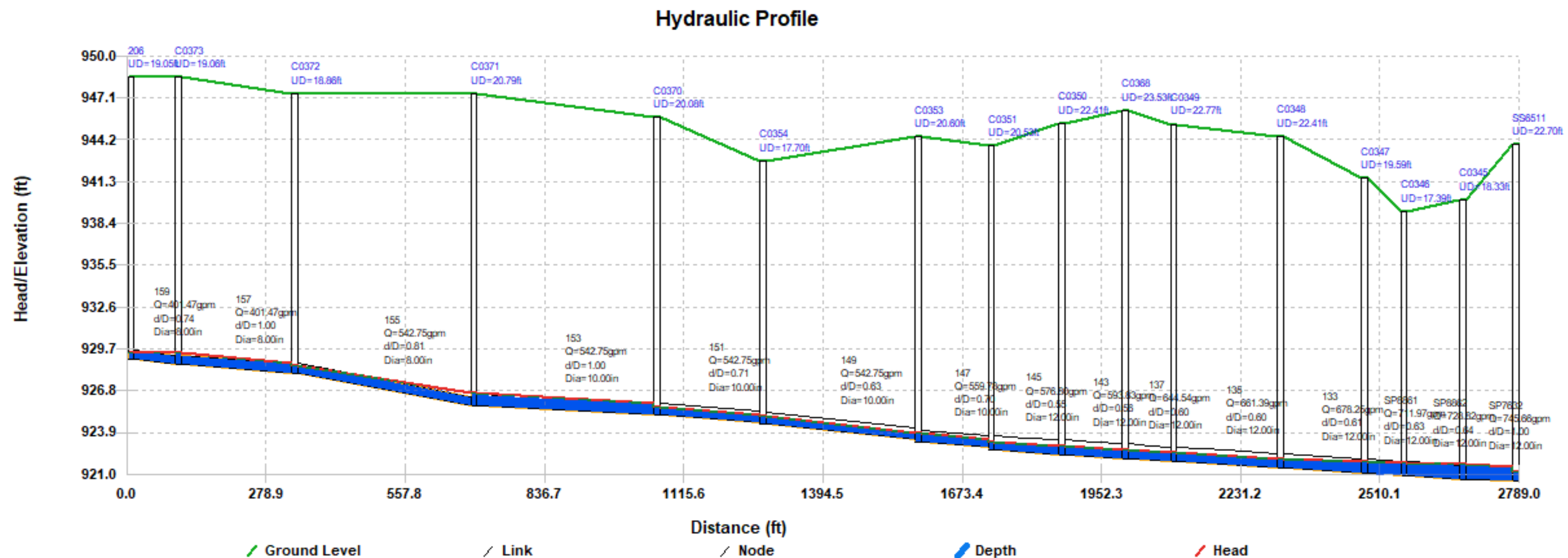




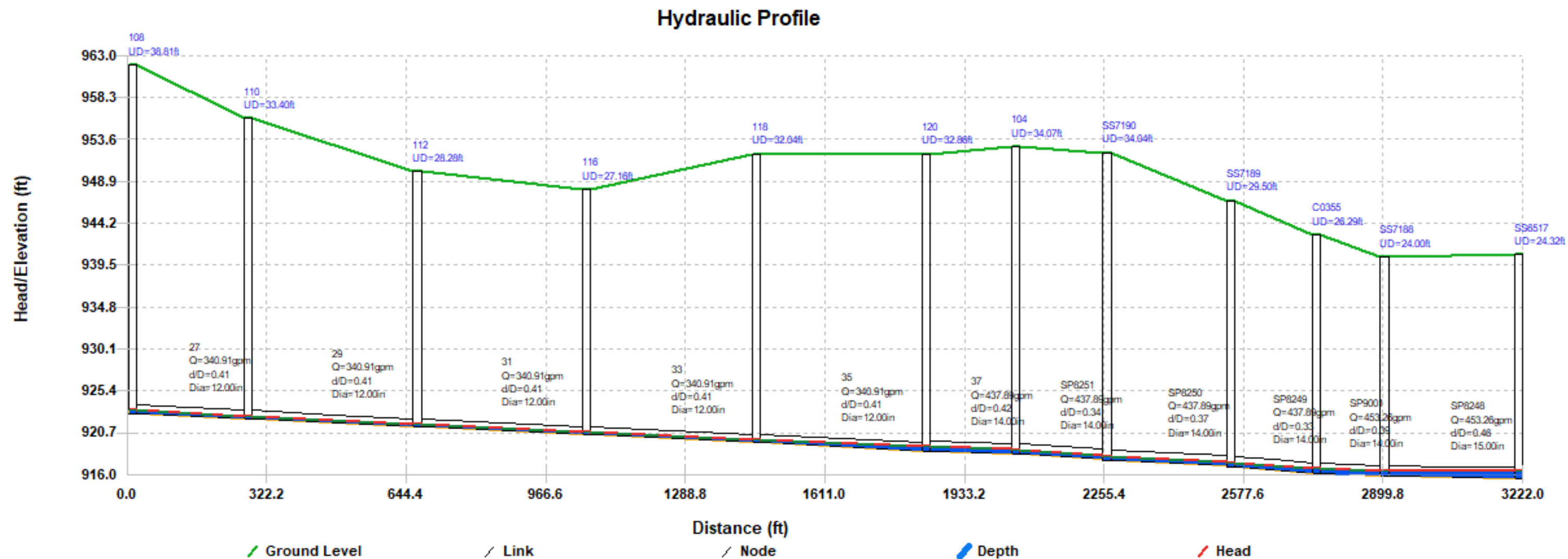
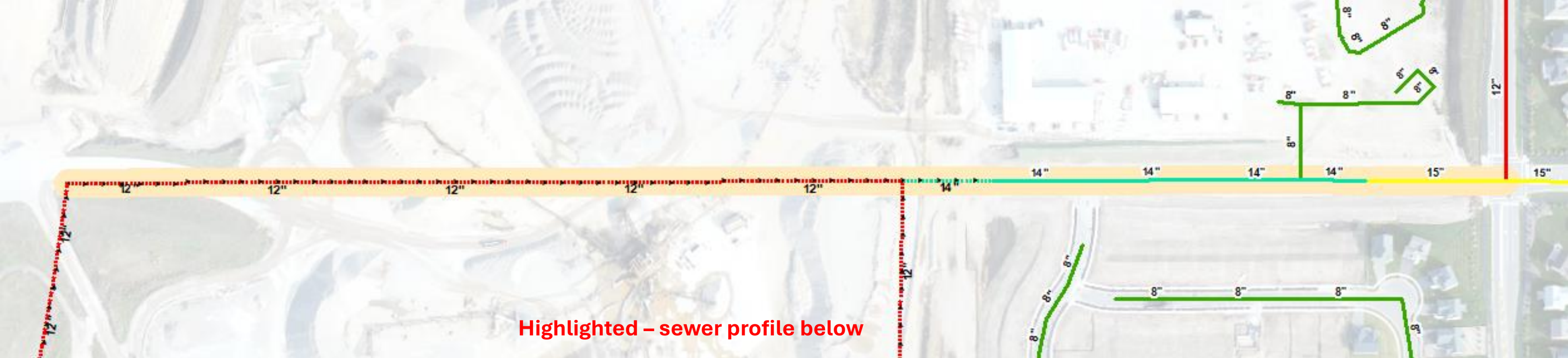
Scenario 5 MBC replaced with Medium Density Residential
Profile of sewer along JCRR from Co Rd 46 to 157th St



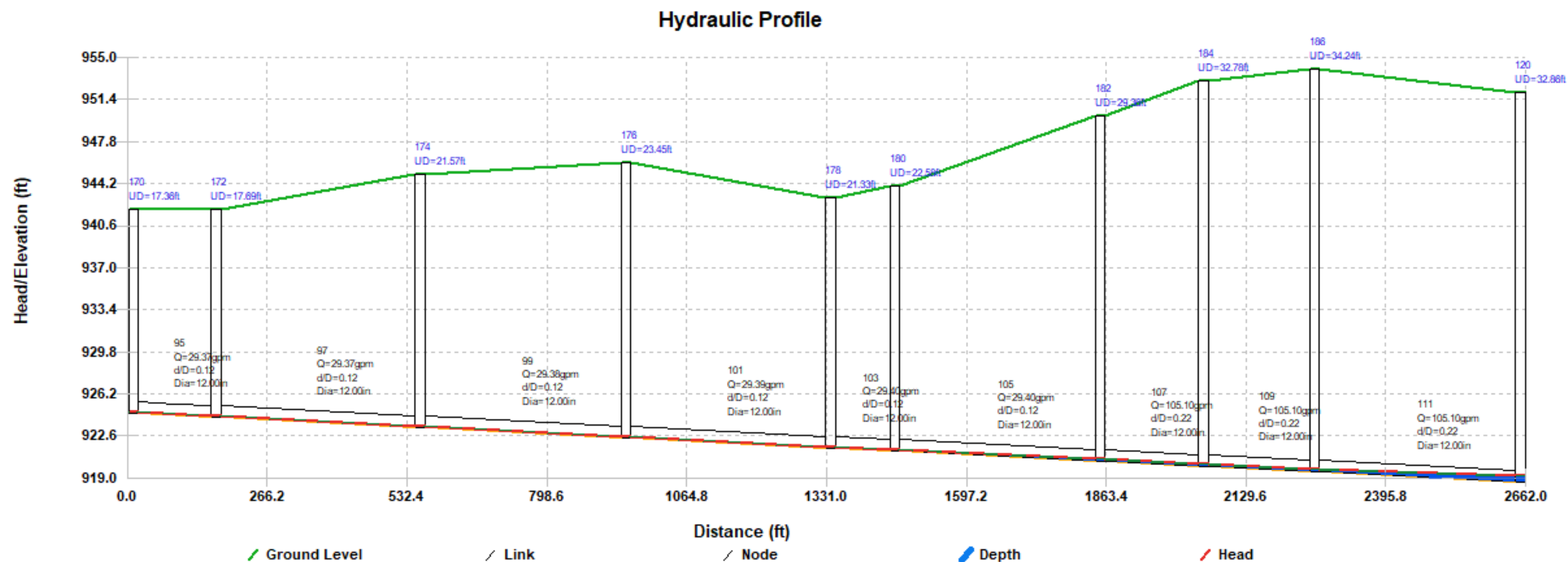
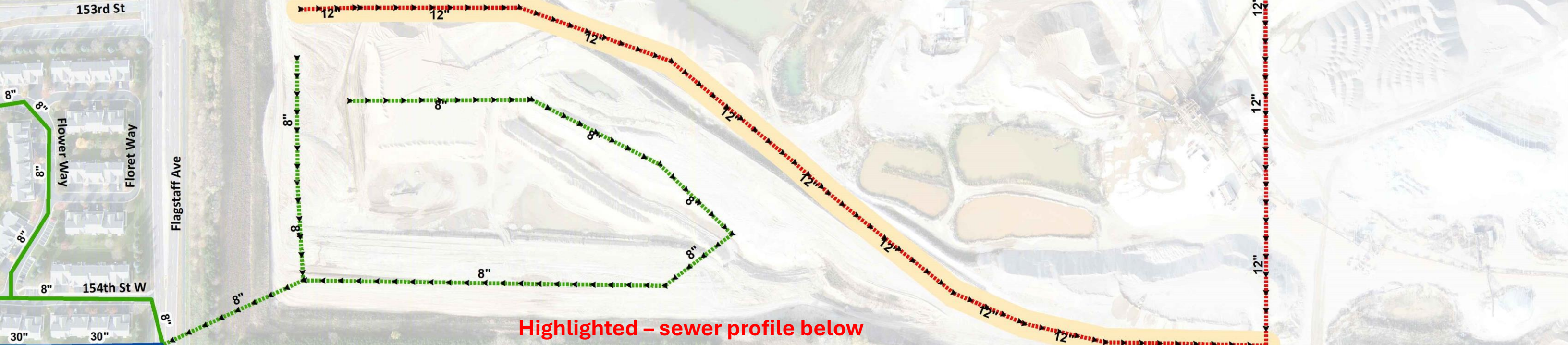
Scenario 5 MBC replaced with Medium Density Residential
 Profile of sewer along 157th St from JCRR to English Ave



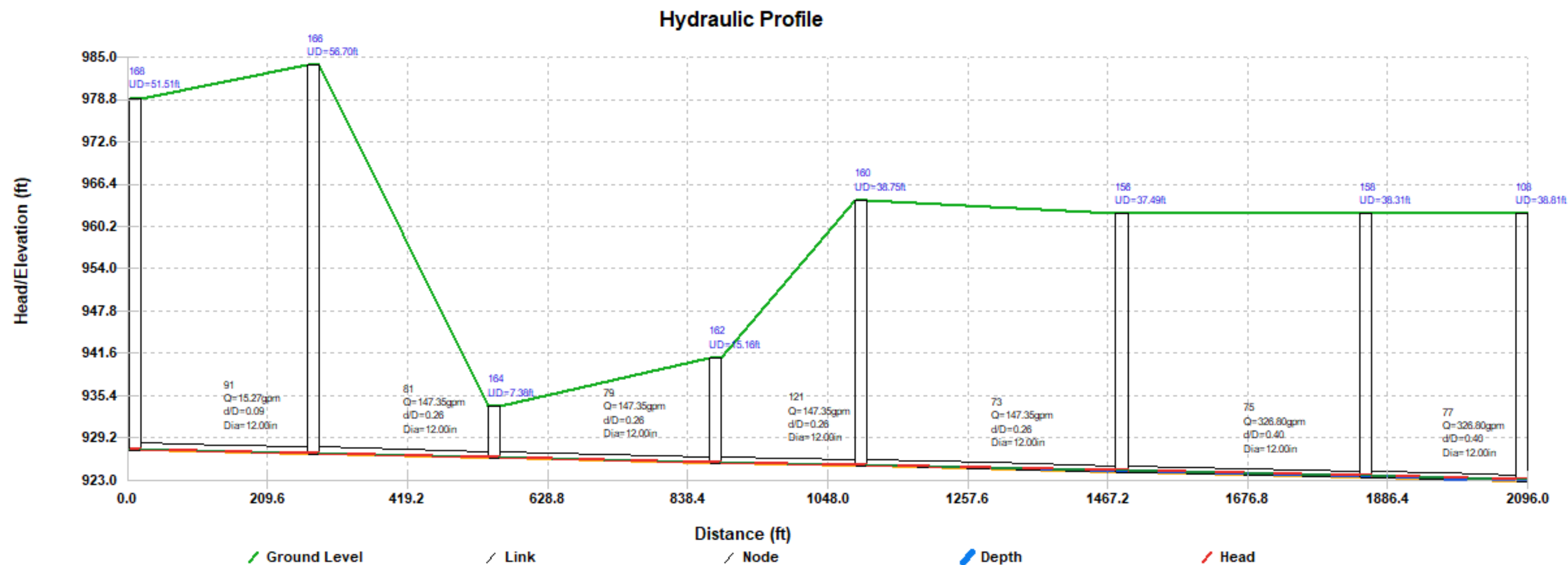
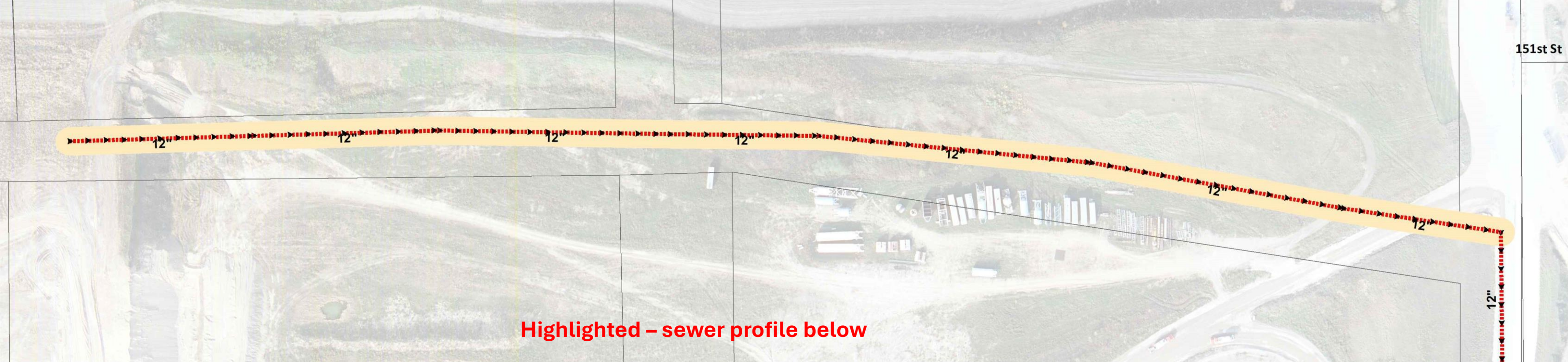
Scenario 5 MBC replaced with Medium Density Residential
Profile of sewer along English Ave from Data Center to 157th St



Scenario 5 MBC replaced with Medium Density Residential
Profile of sewer along JCRR from Data Center to 157th St



Scenario 5 MBC replaced with Medium Density Residential
Profile of sewer along 153rd St from Flagstaff Ave to JCRR



Scenario 5 MBC replaced with Medium Density Residential
Profile of sewer along 151st St from Flagstaff Ave to JCRR



Exhibit 6

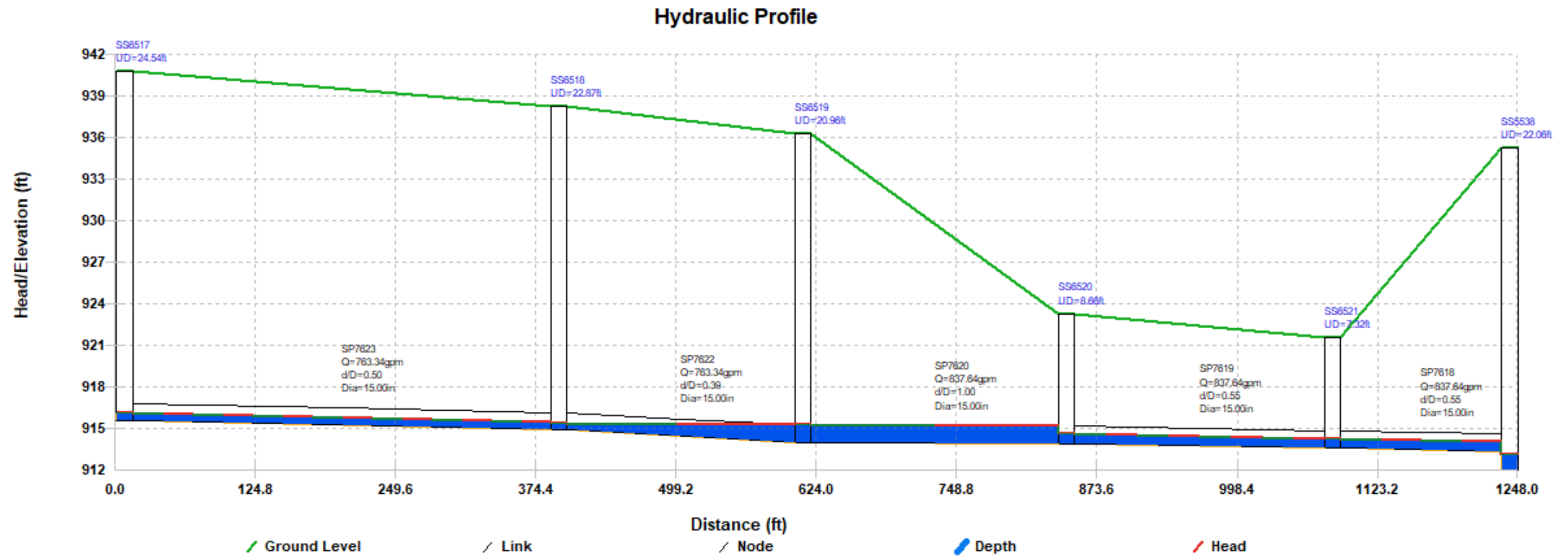
CONCEPTUAL SEWER LAYOUT

SCENARIO 6

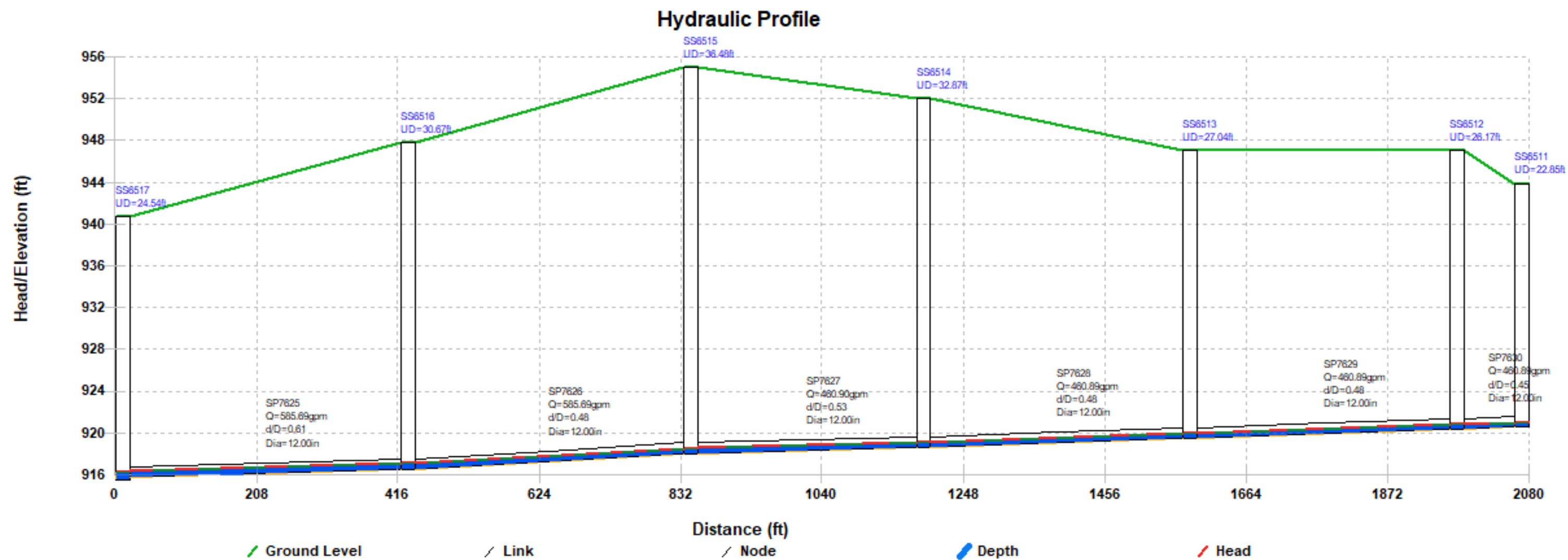
MBC REPLACED WITH LOW DENSITY RESIDENTIAL

Date: 3/26/2025

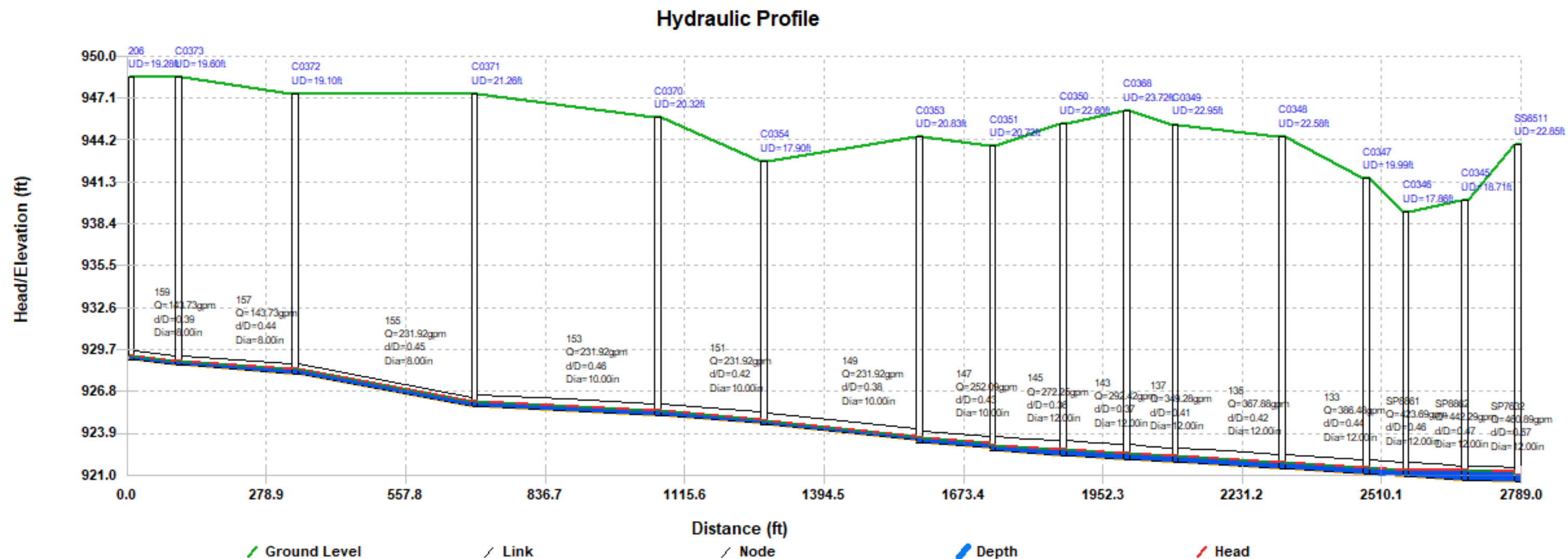




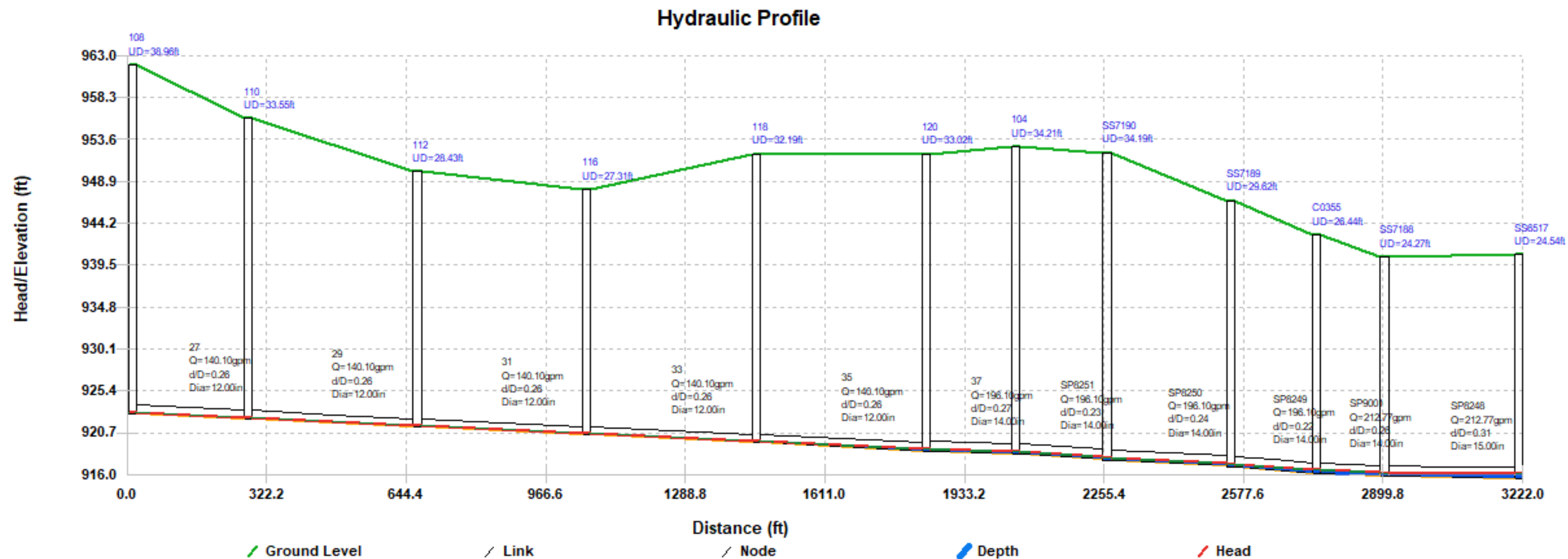
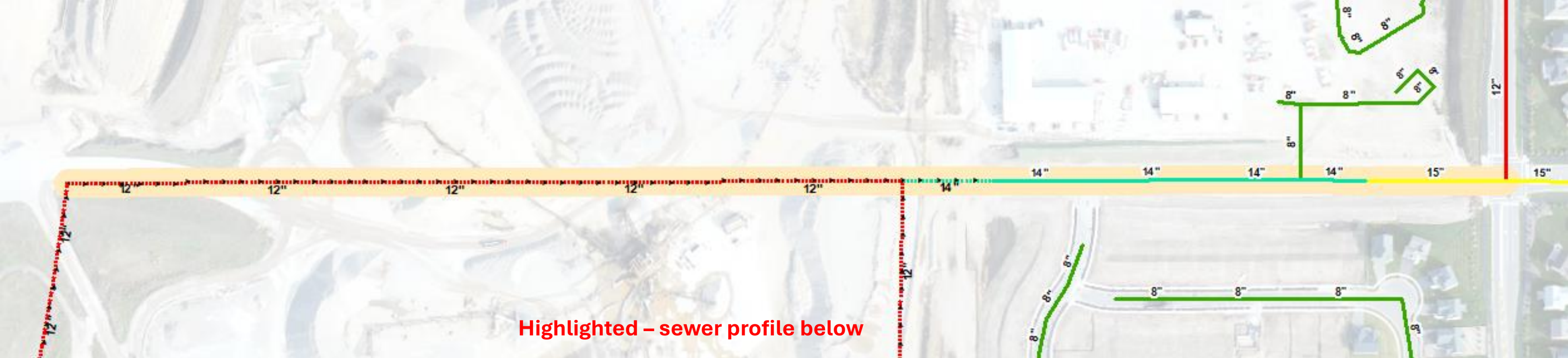
Scenario 6 MBC replaced with Low Density Residential
Profile of sewer along JCRR from Co Rd 46 to 157th St



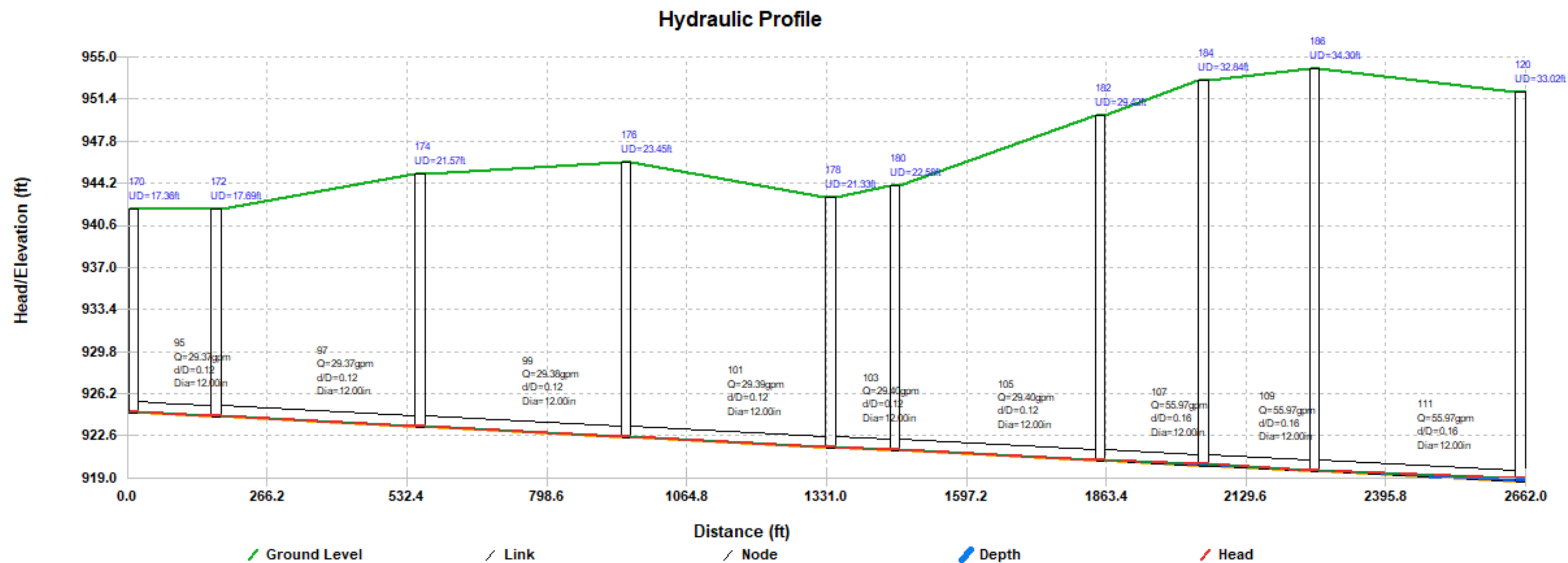
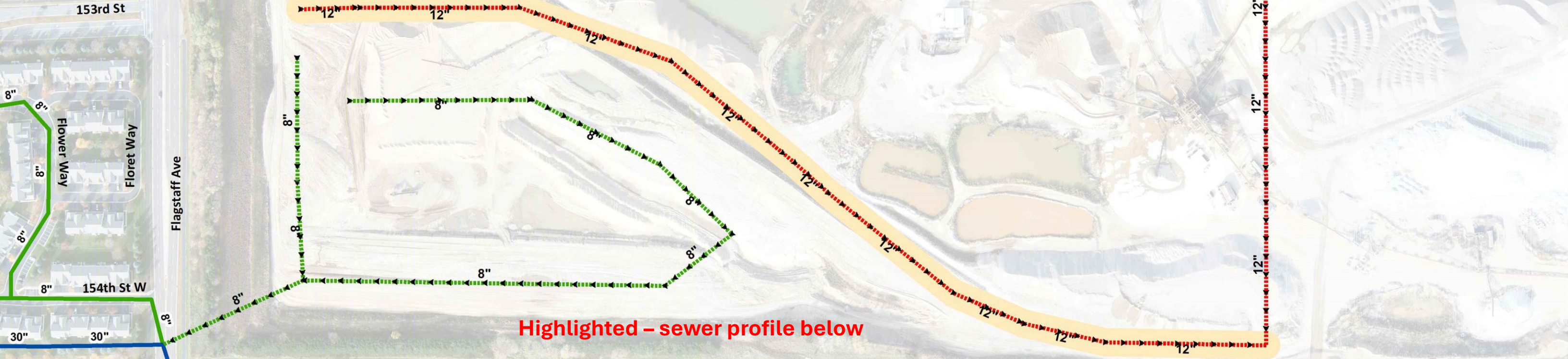
Scenario 6 MBC replaced with Low Density Residential
 Profile of sewer along 157th St from JCRR to English Ave



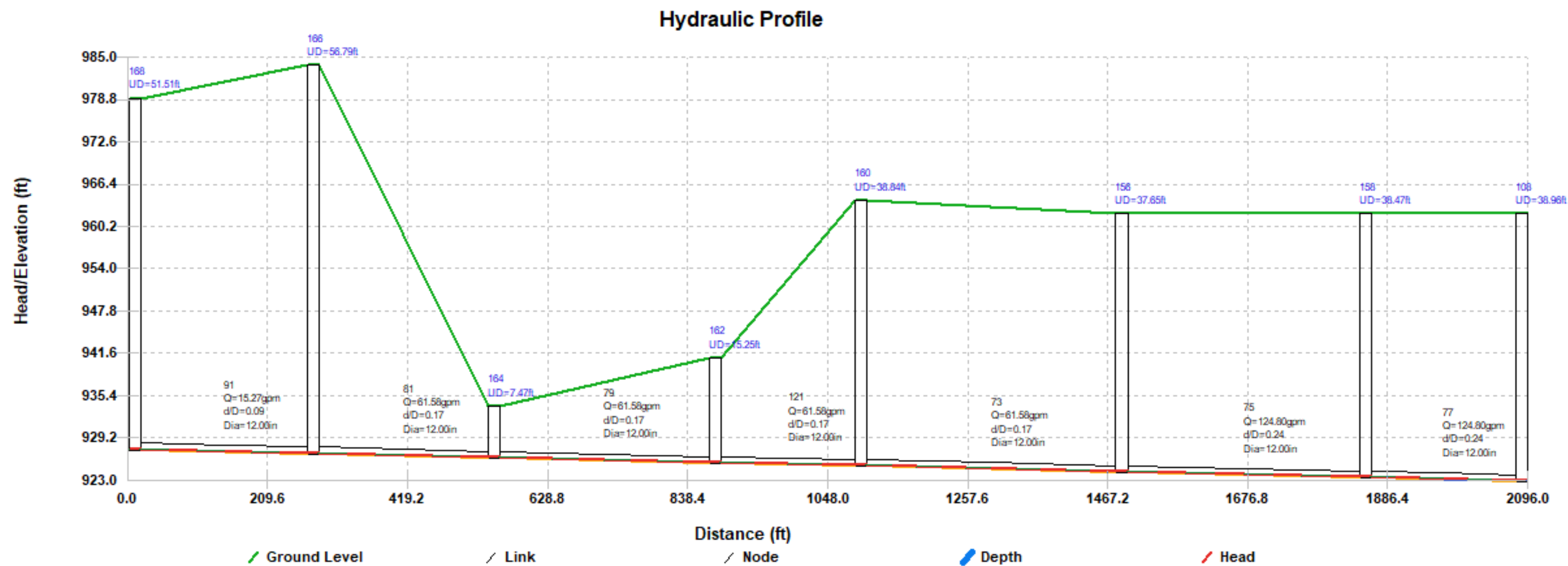
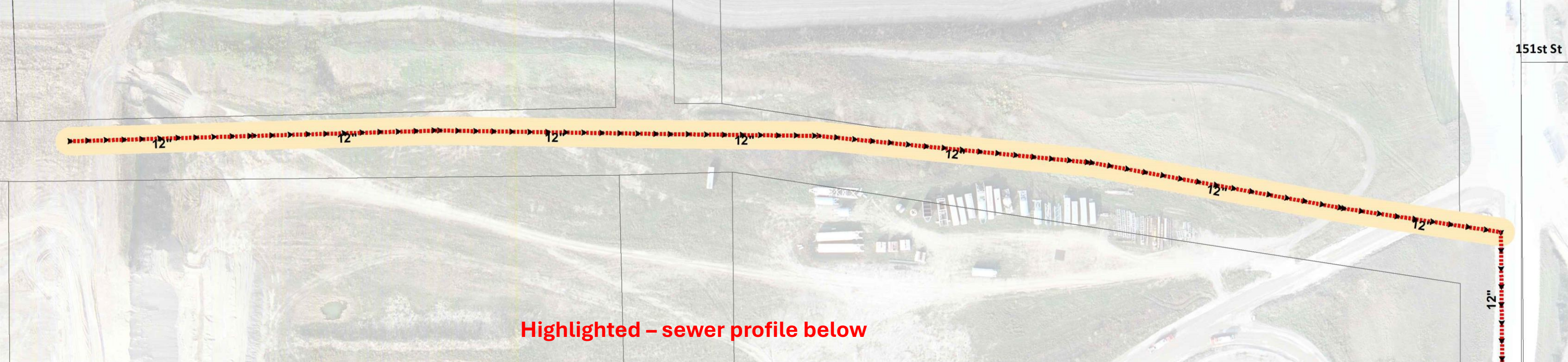
Scenario 6 MBC replaced with Low Density Residential
Profile of sewer along English Ave from Data Center to 157th St



Scenario 6 MBC replaced with Low Density Residential
Profile of sewer along JCRR from Data Center to 157th St



Scenario 6 MBC replaced with Low Density Residential
Profile of sewer along 153rd St from Flagstaff Ave to JCRR



Scenario 6 MBC replaced with Low Density Residential
Profile of sewer along 151st St from Flagstaff Ave to JCRR