Sanitary Sewer System

Feasibility Study

City of New Prague, MN
September 9, 2024

Real People. Real Solutions.

Submitted by:
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BMI No. 0M1.131949

Certification

Feasibility Study

For

Sanitary Sewer System

City of New Prague, Minnesota
0M1.131949

September 9, 2024

PROFESSIONAL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature: _____

Typed or Printed Name: Timothy J. Olson, P.E. (MN, IA, ND, WI), C.F.M.

Date: Sept. 9, 2024 License Number: 49129

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Tables

Appendix

I. Project Background

Bolton & Menk has assisted the City of New Prague in understanding the impacts of future development on current and future sanitary sewer infrastructure. Five future lift stations will serve the area surrounding the City within their anticipated future growth boundary. Four of these were previously proposed in the City's Sanitary Sewer Comprehensive Plan (SEH, 2018).

SEH, Inc. has modeled the City's sanitary network in an InfoSWMM model which is used to evaluate the existing pipe capacities where future lift stations will tie in. Future trunk sanitary pipes and trunk force mains will be routed under future road corridors and be conveyed, generally, from the south to the north and to the existing wastewater treatment plant (WWTP). These future pipes were not included in the InfoSWMM modeling provided by the City. The City is interested in developing pipe routes and sizes, lift station requirements, service area extents, and associated costs to enable future development within the City's growth boundary. Bolton & Menk has assessed these pipe routes and sized them for future development potential. The goals of the project include the following.

- Preliminarily identify the pipe routes that match future transportation networks and previously identified lift station locations.
- Provide as much gravity service as possible based on the City's future growth boundary, understanding critical elevation points like low areas or creek crossings.
- Establish design discharge rates to size pipe and assume they will be constructed at minimum grade.
- Establish preliminary pipe layouts and lift station depths to maximize sewer service areas.

II. Service Discharge Estimates

The City's land use-based sanitary loading rates from the 2018 Comp Plan (***Appendix A***) provide the basis for determining the expected average daily flow per acre of developable land. These rates are shown in ***Table 1*** below.

Table 1: Land Use Based Sanitary Loading Rates (SEH Inc., 2018)

Land Use Code	Sanitary Loading Rate (Gal/Acre/Day)	Land Use Description
AG_VAC	2	Agricultural / Vacant
COM	1020	Commercial
GOLF	4	Golf Course
INDUSTRIAL	933	Industrial
PARK	4	Park
PUBLIC	310	Public
RED_MED	990	Medium Density Residential
RESINGLE	512	Low Density Residential
RESMULTI	1350	High Density Residential
ROW	0	Right-of-way

Undevelopable areas include 60' wide future road corridors and wetlands accessed from the National Wetlands Inventory (NWI) and were excluded from the summation of flows. See the attached lift station service area figure in ***Appendix C*** for the extents each lift station is expected to service.

Table 2: Summary of Service Areas and Average Daily Flow (ADF).				
Lift Station Area	**Total Service Area (acres)**	**Land-Use Based Average Daily Flow (MGD)**	**Additional Upstream ADF (MGD)**	**Total ADF to Forcemain (MGD)**
Southwest Lift Station (SWLS)	1617	0.958	0.240 from SLS	1.198
South Lift Station (SLS)	366	0.240	None	0.240
Southeast Lift Station (SELS)	760	0.622	None	0.622
Northeast Lift Station (NELS)	1262	0.830	0.622 from SELS	1.452
Northwest Lift Station (NWLS)	513	0.494	1.248 from GRAV_W, SWLS, and SLS, and 0.419 MGD additional flow from current areas	2.161
Gravity-West (GRAV_W)	97	0.050	None	N/A

III. Proposed Network

The proposed future sanitary network was laid out based on Figures 18 and 19 in the City of New Prague Sanitary Sewer Comprehensive Plan (SEH Inc., 2018). The network was then adjusted to align with future road corridors. The project team completed a capacity analysis of this proposed network in Autodesk Storm and Sanitary Analysis (SSA) using a steady-state approach. This resulted in the pipe sizes found in the plan set in ***Appendix C***. The pipe layout was built into Autodesk Civil 3D to represent the plan and profile using these pipe sizes along with minimum grades from Chapter 30 of the 10 States Standards. ***Appendix A*** shows the proposed lift station service areas and related trunk sanitary network.

IV. Summary of Proposed Lift Stations, Depths, and Force Mains

The proposed lift station locations are limited to depths based on critical elevations within their sewersheds. These include streams, ditches, and low-lying areas that restrict proposed sanitary sewer depths to 7' below them. As such, the downstream alignment of these low areas even at minimum grade results in excessive lift station build heights, defined as 30' or deeper at the gravity tie-in elevation. To assess the impact of reducing the depths to 30' or less for two lift station service areas, a depth analysis confirms the possibility of reducing the depths with the impact of reducing the service area flowing to the Northeast and Southeast lift stations. ***Appendix B*** shows the impact of reducing the lift station depths. ***Table 3*** shows the lift station LiDAR elevation, gravity tie-in shown on plans, and the elevation after completing the depth analysis.

Table 3: Summary of Lift Station Elevations and Depth Analysis					
Lift Station	**LiDAR Ground Elev.(ft)**	**Gravity Lines Elev. in Profiles (ft)**	**Gravity Lines Depth in Profiles (ft)**	**Gravity Line Discharge Elev. After Depth Analysis (ft)**	**Gravity Lines Depth After Depth Analysis (ft)**
Southwest	992.04	962.55	29.49	-	-
South	994.98	986.61	8.37	-	-
Southeast	1014.97	979.75	35.22	984.75	30.22
Northeast	980.07	935.32	44.75	951.32	28.75
Northwest	955.50	927.59	27.91	-	-

In the Northeast area, the lift station depth shown in the profile sheets is 44.75'. To reduce the depth to 28.75' and be above the 30' preference set by the City, the lift station and upstream manhole inverts can be raised by 16' through the N4 alignment. This will exclude 1300' of 8" sanitary line long the NELS N4 alignment, which would have cover issues after raising the pipes-pipe sections would be above ground or less than 7' deep. The now-excluded area could be served with its own lift station as an alternative but the rest of the NELS gravity network can remain unchanged. This is shown in ***Appendix B***.

In the Southeast area, the lift station depth shown in the profile sheets is 35.22' and could be raised by 5' to 30.22' while part of the SELS S2 alignment will then have pipe with less than 7' of cover. This area could be served with their own lift station, while the gravity network upstream of the meeting of the SELS S1 and S2 alignments besides a couple of manholes can remain unchanged along with the N alignments in the SE area.

An important factor to weigh in this depth analysis is cost. The difference between having a deeper lift station vs adding another lift station includes such factors as maintenance cost, construction cost, pump cost, build height, acquiring additional right of way, and the additional excavation cost in construction of trunk pipes and service connections.

Given the proposed future lift stations serve new gravity distribution systems and do not tie into the existing sanitary sewer system, it should be noted that many of these proposed lift stations run in series. In other words, the South Lift Station flows through the Northwest Lift Station, and ultimately the Northeast Lift Station before discharging to the WWTP. If the South Lift Station is constructed first, temporary gravity connections would need to be analyzed, or the entire gravity main connection and lift station network constructed. The same can be said for the Southeast Lift station and subsequent infrastructure to the north.

Based on the service areas and Average Daily Flows noted in Table 2, Design Peak Hourly Flows (DPHF) were projected for each lift station. Lift Stations need to be able to pump the DPHF with one pump out of service. The peaking factors were developed for each service area utilizing criteria from the Recommended Standards for Wastewater Facilities. Force main sizes were then determined based on the pumping capacity of each lift station and pipeline velocity.

Cost estimates were developed for each of the proposed lift stations. Costs include backup power for each location, Supervisory Controls, pumps, piping and wet well/dry well structures. In all cases a submersible style lift station was utilized as the basis for the estimate. ***Table 4*** summarizes the lift station design and estimated costs. ***Appendix D*** contains additional assumptions, lift station sizing information, and force main assessments.

Table 4: Summary of Proposed Lifts Stations and Force Mains

Lift Station Area	Design Pumping Capacity (GPM)	Force Main Size (inches)	Number of Pumps	Estimated Construction Cost
Southwest Lift Station (SWLS)	2,393	10	2	$1,080,000
South Lift Station (SLS)	587	6	2	$570,000
Southeast Lift Station (SELS)	1,363	8	2	$1,075,000
Northeast Lift Station (NELS)	2,816	12	2	$1,060,000
Northwest Lift Station (NWLS)	4,290	14	3	$1,340,000

V. Existing Sewer System Capacity

The existing sewer capacity was also evaluated with inclusion of the proposed network. The proposed network meets the existing sewer system at the following locations.

- 11th Avenue NW Trunk Sanitary Sewer Main
    - An existing 30" pipe along 11th Avenue is currently routed into a 12" pipe along 6th St heading east. Future buildout will include extending the 30" pipe all the way to the NWLS and plugging the upstream end of the 12" on 6th St.
    - This pipe is expected to carry sufficient capacity in the future buildout scenario.
- Southwest Trunk Sanitary Sewer Main
    - An existing 21' deep 30" trunk main is stubbed to the south at 11th Avenue SW (SEH Inc., 2018)
    - This pipe is expected to carry sufficient capacity in the future buildout scenario.
- Chalupsky Lift Station
    - The proposed network will carry existing flow via gravity from the Chalupsky Lift Station to the Alton Trunk Sewer and north to the Northeast Lift Station.
- Lady Slipper Lift Station
    - The proposed network will carry existing flow via gravity from the Lady Slipper Lift Station to the Alton Trunk Sewer and north to the Northeast Lift Station.
- Wastewater Treatment Plant
    - Proposed forcemain routes serving the Northwest Lift Station and Northeast Lift Station will carry flow directly to the wastewater treatment plant, the connection of which is to be determined.
- Possible Connections
    - Additional existing lift stations were discussed throughout the project process for evaluation, including Homefield Lift Station, Central South Lift Station, and CR 37 Lift Station.

VI. Recommendations

This assessment has determined preliminary pipe alignments and sizes to maximize service to the City's future growth limits. We have the following recommendations as the City evaluates future development scenarios and buildout of sewer service.

- Critical elevation points have been noted in the attached Proposed Trunk Lines sheets, C4.00 to C4.05, where pipe cover has reached a depth of 9 feet or less. These locations have largely dictated the ultimate lift station depth, which should be evaluated further for constructability. For the purpose of this study, it was assumed that all service is gravity to the lift station. Additional assessment may be needed to determine:
    - Locations of additional upstream lift stations.
    - Reduced service areas to keep all future service as gravity.
- As development proposals are presented to the City, modeling should be updated for actual anticipated service flows and ultimate pipe alignment. The model is dynamic and can be

managed concurrently with development scenarios.

A. Preliminary Cost Estimate

The total system buildout will include extra costs not covered by this feasibility study and so a 30% contingency is added to the current estimate based on 2023 construction costs and an estimated 20% engineering and management cost. The quantities and cost estimate in ***Table 5*** are reflective of the quantities of the attached plan set. These costs include only items related to the sanitary sewer collection and distribution system and lift stations. They do not include costs associated with roadway improvements, major grading, permitting, or other minor associated construction and surface restoration items. Additional detailed information regarding lift station sizing and cost estimates is located in the Appendix.

Table 5: Preliminary Cost Estimate

Item No.	Item	Estimated Quantity	Unit	Unit Price*	Total Amount
GRAV_W	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	290	LF	$766	$222,500
	CONNECT TO EXISTING SANITARY SEWER	2	EA	$2,615	$5,200
	8" PVC PIPE SEWER	4444	LF	$97	$429,900
				GRAV W SUBTOTAL:	**$657,600**
SWLS	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	1691	LF	$766	$1,295,500
	CONNECT TO EXISTING SANITARY SEWER	1	EA	$2,615	$2,600
	CONNECT TO EXISTING MANHOLES (SAN)	1	EA	$1,690	$1,700
	8" PVC PIPE SEWER	17536	LF	$97	$1,696,500
	10" PVC PIPE SEWER	5920	LF	$141	$834,700
	12" PVC PIPE SEWER	5705	LF	$143	$817,400
	15" PVC PIPE SEWER	4753	LF	$144	$684,500
	18" PVC PIPE SEWER	2300	LF	$186	$428,700
	10" FORCEMAIN HDPE PIPE SEWER	3572	LF	$180	$643,000
	CONSTRUCT LIFT STATION	1	EA	$1,080,000	$1,080,000
				SWLS SUBTOTAL:	**$7,484,600**
SLS	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	520	LF	$766	$398,800
	CONNECT TO EXISTING MANHOLES (SAN)	1	EA	$1,690	$1,700
	8" PVC PIPE SEWER	8669	LF	$97	$838,700
	10" PVC PIPE SEWER	1177	LF	$141	$166,000
	8" FORCEMAIN HDPE PIPE SEWER	763	LF	$160	$122,000
	CONSTRUCT LIFT STATION	1	EA	$570,000	$570,000
				SLS SUBTOTAL:	**$2,097,200**
SELS	CONNECT TO EXISTING MANHOLES (SAN)	1	EA	$1,690	$1,700
	8" PVC PIPE SEWER	9736	LF	$97	$941,800
	10" PVC PIPE SEWER	1148	LF	$141	$161,800
	12" PVC PIPE SEWER	6186	LF	$143	$886,400
	10" FORCEMAIN HDPE PIPE SEWER	3932	LF	$180	$707,700
	CONSTRUCT LIFT STATION	1	EA	$1,075,000	$1,075,000
				SELS SUBTOTAL:	**$3,774,400**
NELS	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	2059	LF	$766	$1,577,900
	CONNECT TO EXISTING SANITARY SEWER	2	EA	$2,615	$5,200
	CONNECT TO EXISTING MANHOLES (SAN)	1	EA	$1,690	$1,700
	CONNECT TO EXISTING FORCE MAIN	1	EA	$8,371	$8,400

Table 5: Preliminary Cost Estimate					
Item No.	Item	Estimated Quantity	Unit	Unit Price*	Total Amount
	8" PVC PIPE SEWER	10733	LF	$97	$1,038,300
	10" PVC PIPE SEWER	5481	LF	$141	$772,700
	18" PVC PIPE SEWER	1289	LF	$186	$240,200
	21" PVC PIPE SEWER	2929	LF	$203	$595,500
	24" RC PIPE SEWER CLASS V	1371	LF	$115	$157,100
	10" FORCEMAIN HDPE PIPE SEWER	2354	LF	$180	$423,700
	REMOVE LIFT STATION	2	EA	$30,000	$60,000
	CONSTRUCT LIFT STATION	1	EA	$1,060,000	$1,060,000
				NELS SUBTOTAL:	**$5,940,700**
NWLS	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	1027	LF	$766	$787,000
	CONNECT TO EXISTING SANITARY SEWER	1	EA	$2,615	$2,600
	CONNECT TO EXISTING MANHOLES (SAN)	1	EA	$1,690	$1,700
	CONNECT TO EXISTING FORCE MAIN	1	EA	$8,371	$8,400
	PLUG AND ABANDON PIPE SEWER	1	EA	$1,750	$1,800
	8" PVC PIPE SEWER	6313	LF	$97	$610,800
	10" PVC PIPE SEWER	2612	LF	$141	$368,200
	15" PVC PIPE SEWER	733	LF	$144	$105,600
	36" RC PIPE SEWER CLASS V	3040	LF	$335	$1,018,400
	12" FORCEMAIN HDPE PIPE SEWER	9092	LF	$200	$1,818,400
	CONSTRUCT LIFT STATION	1	EA	$1,340,000	$1,340,000
				NWLS SUBTOTAL:	**$6,062,900**
				ESTIMATED SUBTOTAL:	**$26,017,400.00**
				SUBTOTAL:	$26,017,400
				20% CONTINGENCY:	$5,203,480
				TOTAL ESTIMATED CONSTRUCTION COST:	**$31,220,880**
				DESIGN, ADMINISTRATION AND CONSTRUCTION ENGINEERING:	$4,683,130
				TOTAL ESTIMATED PROJECT COST:	**$35,904,010**

B. Project Funding Opportunities

There are several funding options the city can explore to help finance the recommended sanitary sewer improvements. Any costs sited in the recommendations below are associated with the items contained in this report only. These are described in the following sections.

1. Local Wastewater Rates and Sewer Access Charges - The City can enact wastewater rate and sewer access charges to offset the cost of implementing comprehensive sewer collection system costs. The current rate system includes a $7,150 charge per Residential Equivalent Unit (REU). Trunk Sewer fund charges represent 17% of this charge, or $1,215.50. In order to appropriately address the allocation of cost between current trunk charges and cost of development to proposed new areas, a comprehensive fee and rate study should be undertaken.

   Table 6 is a summary of potential area charges. Area charges can be specific to each lift station and its service area. This option isolates the costs to the service area which results in variable per acre costs. If the city would prefer to normalize the total system sewer service and lift station cost, the cost per acre would be evenly distributed across the development area.

Table 6: Summary of Per Acre Costs

Lift Station Area	Total Service Area (acres)	Infrastructure & LS Costs (w/ Contingency)	Cost per Acre
Southwest Lift Station (SWLS)	1617	$9,860,265	$6,100
South Lift Station (SLS)	366	$2,696,220	$7,400
Southeast Lift Station (SELS)	760	$5,768,955	$7,600
Northeast Lift Station (NELS)	1262	$7,777,890	$6,200
Northwest Lift Station (NWLS)	513	$7,878,330	$15,400
Gravity-West (GRAV_W)	97	$887,760	$9,200
TOTALS	**4615**	**$34,869,420**	**$7,600**

2. Bonding - The City could sell general obligation, local improvement, or revenue bonds in order to raise the capital costs for the sanitary sewer improvements. The proceeds of the bonds would need to be repaid, either through property taxes, assessments, user charges or availability charges.

3. Assessment - A portion of the capital costs of the sanitary sewer improvements can be assessed to local property owners under Minnesota Statute 429. Using this method, a one-time assessment could be levied and repaid over a period of 10 to 20 years. This cost could help offset some monthly increases in user fees and permit use of general obligation bonding.

4. State Revolving Fund Loan - The Clean Water Revolving Fund (CWRF) loan program was created under the State Revolving Fund (SRF) provisions in the Federal Clean Water Act to provide financial assistance for water pollution control projects. Minnesota's revolving loan program provides loans to municipalities for planning, design, and construction of wastewater treatment projects. The loans are typically for a 20-year period at an interest rate of two to four percent (one to two percentage points below market). The loan monies are administered through the Public Facilities

Authority (PFA). To be eligible for PFA funding, the City must submit this Facility Plan for review and approval by the Minnesota Pollution Control Agency.

Revenue for loan repayment is typically generated by user rates, availability charges, or assessment. In recent years, interest rates have been approximately one percent, and this has proven to be an excellent funding source for these types of projects.

5. Small Cities Development Program - The Small Cities Development Program provides federal grants from the US Department of Housing and Urban Development to local units of the government on a competitive basis for a variety of community development projects. Eligible applicants include cities and townships with populations under 50,000 and counties with populations under 200,000.

   The proposed project must meet one of the three national objectives:

   - Benefit to low and moderate low-income persons.
   - Elimination of slum and blight conditions.
   - Elimination of an urgent threat to public health or safety.

   In addition, the proposed activities must be eligible for funding, project needs must be documented, and the general public must be involved in the application preparation.

   Under this program, Small Cities Development Public Facility grants are available for wastewater treatment facility projects. The maximum grant award for a public facility project is $600,000.

6. Wastewater Infrastructure Funding Program - Supplemental assistance to municipalities is currently available through the Water Infrastructure Fund (WIF) program. PFA administers the WIF program to communities that apply for funding under the CWRF loan program or the United States Department of Agriculture Rural Economic and Community Development's (USDA/RECD) Water and Waste Disposal Loans and Grants Program.

   Assistance is in the form of zero percent loans, which may be forgiven upon receipt of the notice from MPCA that the project operational performance standards have been met.

7. Economic Development Administration - The Economic Development Administration (EDA) has a grant program, which is used to help communities develop the infrastructure required to attract or maintain businesses or industries. Grant sizes vary depending upon the community's need and the impact the project would have on the community. To qualify for this funding source, it would need to be determined how the improvement would spur economic growth.

8. League of Minnesota Cities - The League of Minnesota Cities has a Grant Navigator program that to help members assess government grant programs and local needs. The program will help city leaders understand, identify, and apply for grant funding for city projects. The city could apply for a grant from the League to explore funding options for specific projects.

Appendix A: Proposed Lift Station Service Area Extents GIS Figure

Sanitary Sewer System Feasibility Study

City of New Prague

Lift Station Service Areas

April 2024

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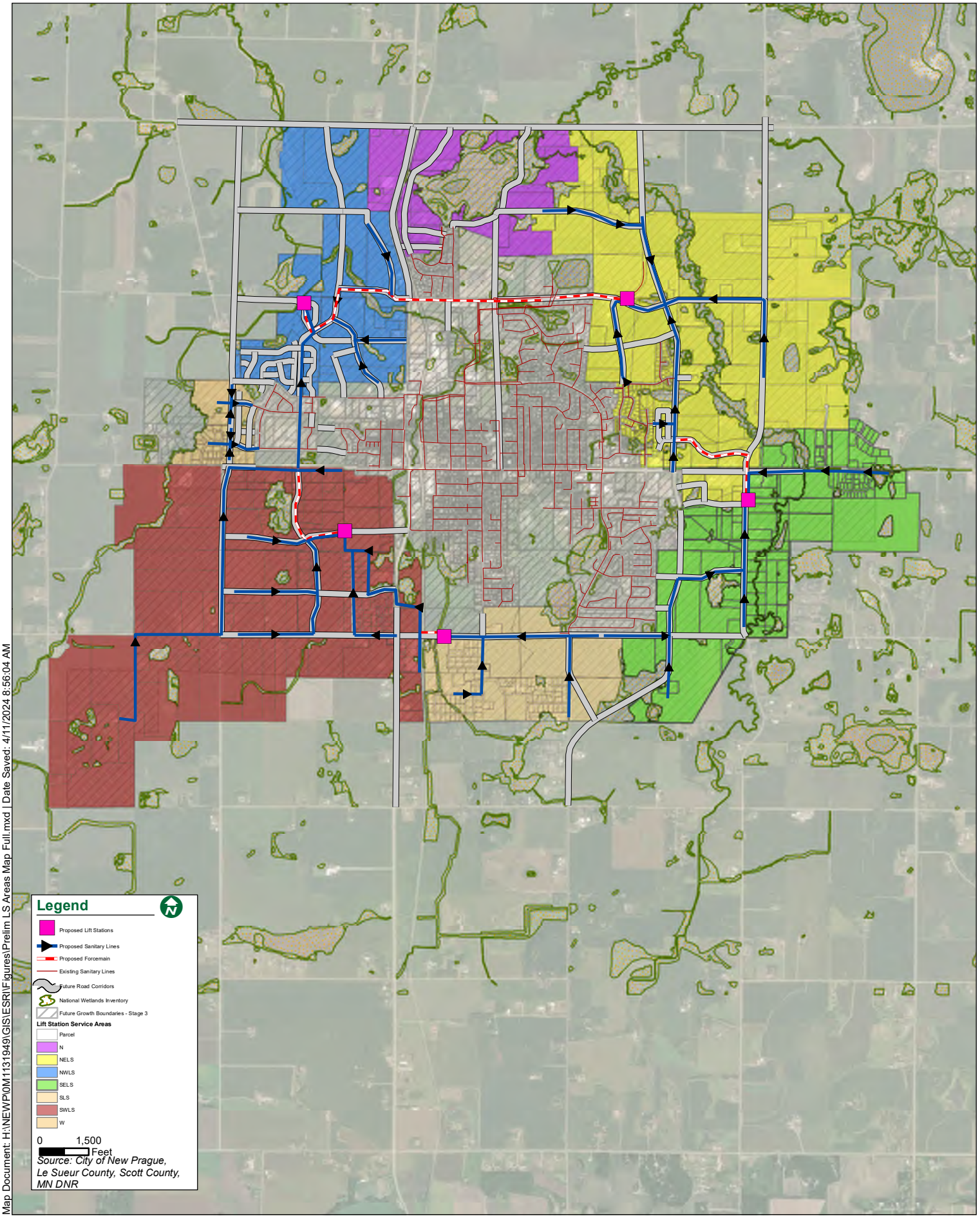

Map Document: H:\NEWP\0M1131949\GIS\ESRI\Figures\Prelim LS Areas Map Full.mxd | Date Saved: 4/11/2024 8:56:04 AM

Appendix B: Southeast and Northeast Lift Station Depth Analyses

Raise upstream end by 16'

NELS_N4

C4.78 - C4.80

CRITICAL ELEVATION POINT
GROUND=963.40'
INVERT=954.39'

Remove 1300' from NELS_N4 gravity Alignment due to cover issues - serve this area using lift station

Raise manhole inverts by 16'

NELS_N3

C4.76 - C4.77

CRITICAL ELEVATION POINT
GROUND=968.60'
INVERT=961.34'

NELS_FM6

C4.83 - C4.84

NWLS_FM5

NELS_E5

C4.81 - C4.82

Raise NE lift station discharge elevation by 16' - from 935.32' to 951.32'. New depth is 28.75'

TIE-IN TO EXISTING WWTP

NELS_E8

C4.86 - C4.87

NELS_S2

C4.71 - C4.75

NELS_S1

C4.68 - C4.70

CRITICAL ELEVATION POINT
GROUND=973.19'
INVERT=961.85'

TIE-IN ELEVATION=966'

TIE-IN ELEVATION=975'

NELS_S7

C4.85

CRITICAL ELEVATION POINT
GROUND=998.64'

HORZ. SCALE 0 400 800 FEET

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CITY OF NEW PRAGUE, MINNESOTA
SANITARY SEWER FEASIBILITY STUDY
PROPOSED TRUNK LINES
NELS - ALL ALIGNMENTS

SHEET
C4.04

SELS_FM4

C4.62 - C4.64

CRITICAL ELEVATION POINT
GROUND=998.64'
INVERT=991.62'

SELS_N3

C4.59 - C4.61

SELS_N6

C4.67

Raise manhole inverts by 5'

Raise SE lift station discharge elevation by 5' - from 979.75' to 984.75'. New depth is 30.22'

CRITICAL ELEVATION POINT
GROUND=1002.26'
INVERT=989.64'

CRITICAL ELEVATION POINT
GROUND=1005.10'
INVERT=991.74'

SELS_S1

C4.51 - C4.56

SELS_S2

C4.57 - C4.58

Cover issues in SELS S2 Alignment - possible lift station

CRITICAL ELEVATION POINT
GROUND=1016.80'
INVERT=1007.75'

SELS_S5

C4.65 - C4.66

SLS_E2

HORZ. 0 400 800
SCALE FEET

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CITY OF NEW PRAGUE, MINNESOTA
SANITARY SEWER FEASIBILITY STUDY
PROPOSED TRUNK LINES
SELS - ALL ALIGNMENTS

SHEET
C4.03

Appendix C: Proposed Trunk Line Plan & Profile Sheets

GRAV_W100

GRAV_W110

SWLS_S7

C4.28

TIE-IN ELEVATION=982.12'

SWLS_S6

C4.23 - C4.27

SWLS_FM8

C4.30 - C4.29

CRITICAL ELEVATION POINT
GROUND=978.72'
INVERT=969.90'

SWLS_S3

C4.13 - C4.14

CRITICAL ELEVATION POINT
GROUND=982.50'
INVERT=973.96'

SWLS_S1

C4.06 - C4.10

SWLS_S2

C4.11 - C4.12

SWLS_S4

C4.15 - C4.19

CRITICAL ELEVATION POINT
GROUND=978.48'
INVERT=969.47'

CRITICAL ELEVATION POINT
GROUND=1017.57'
INVERT=1011.76'

SWLS_S1

SLS_FM4

SLS_E1

SWLS_S9

C4.32 - C4.36

SWLS_S5

C4.20 - C4.22

SLS_E3

HORZ. 0 500 1000
SCALE FEET

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CITY OF NEW PRAGUE, MINNESOTA
SANITARY SEWER FEASIBILITY STUDY
PROPOSED TRUNK LINES
SWLS - ALL ALIGNMENTS

SHEET
C4.00

HORZ. SCALE 0 400 800 FEET

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CITY OF NEW PRAGUE, MINNESOTA
SANITARY SEWER FEASIBILITY STUDY
PROPOSED TRUNK LINES
GRAV_W - ALL ALIGNMENTS

SHEET
C4.01

HORZ. SCALE 0 400 800 FEET

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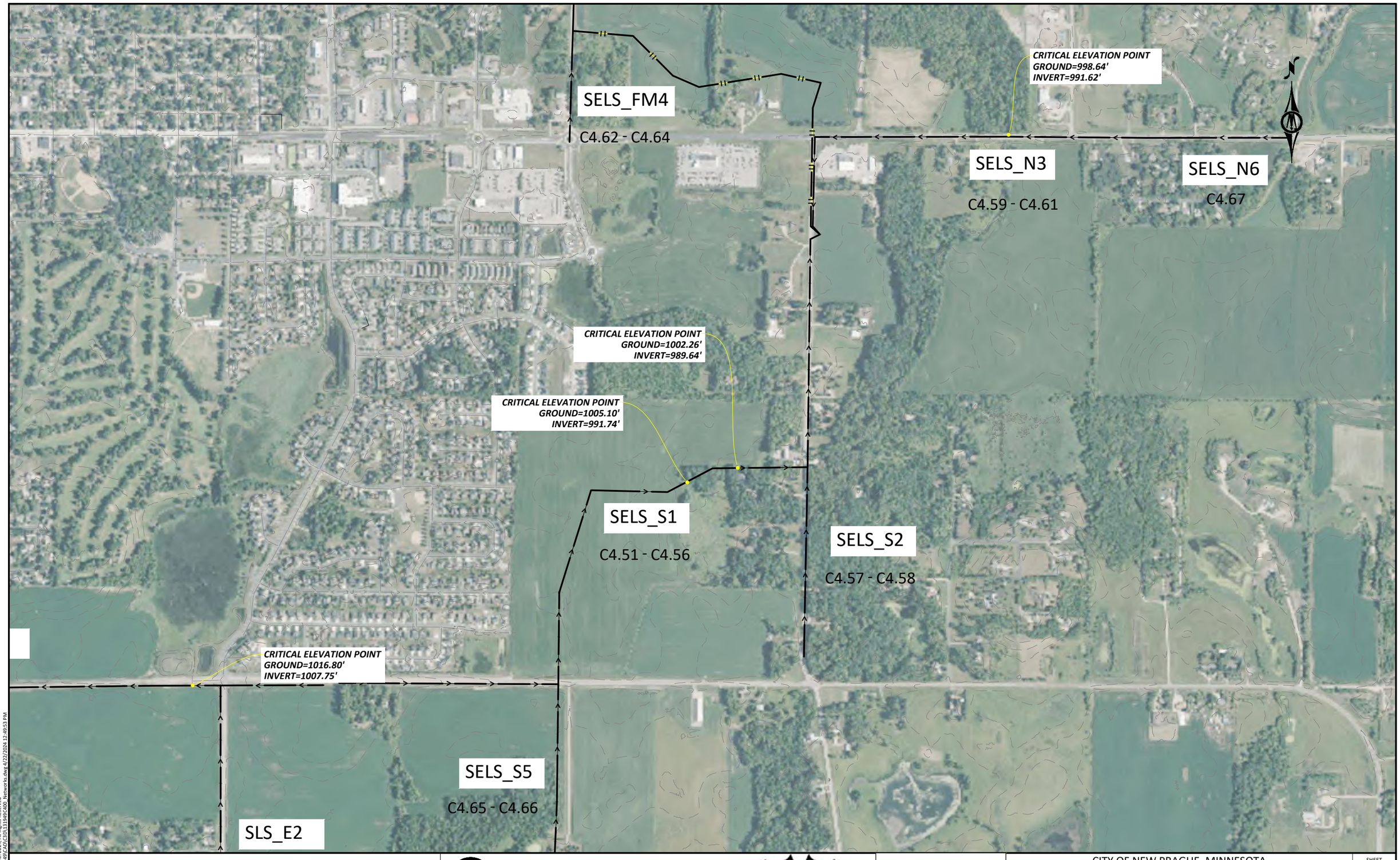
CITY OF NEW PRAGUE, MINNESOTA
SANITARY SEWER FEASIBILITY STUDY
PROPOSED TRUNK LINES
SLS - ALL ALIGNMENTS

SHEET C4.02



HORZ. SCALE 0 400 800 FEET

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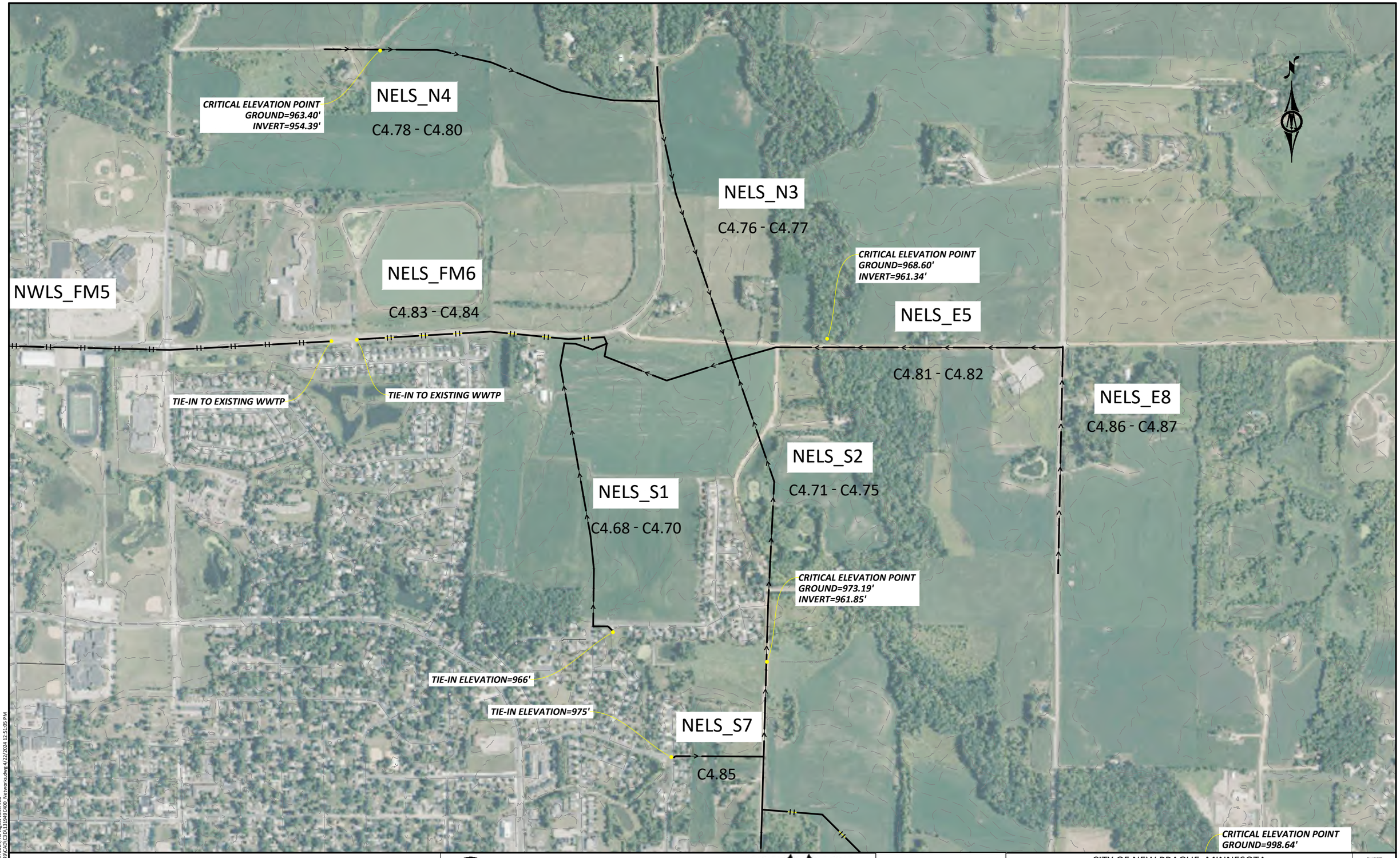
PROPOSED TRUNK LINES
SELS - ALL ALIGNMENTS

SHEET C4.03



HORZ. SCALE 0 400 800 FEET

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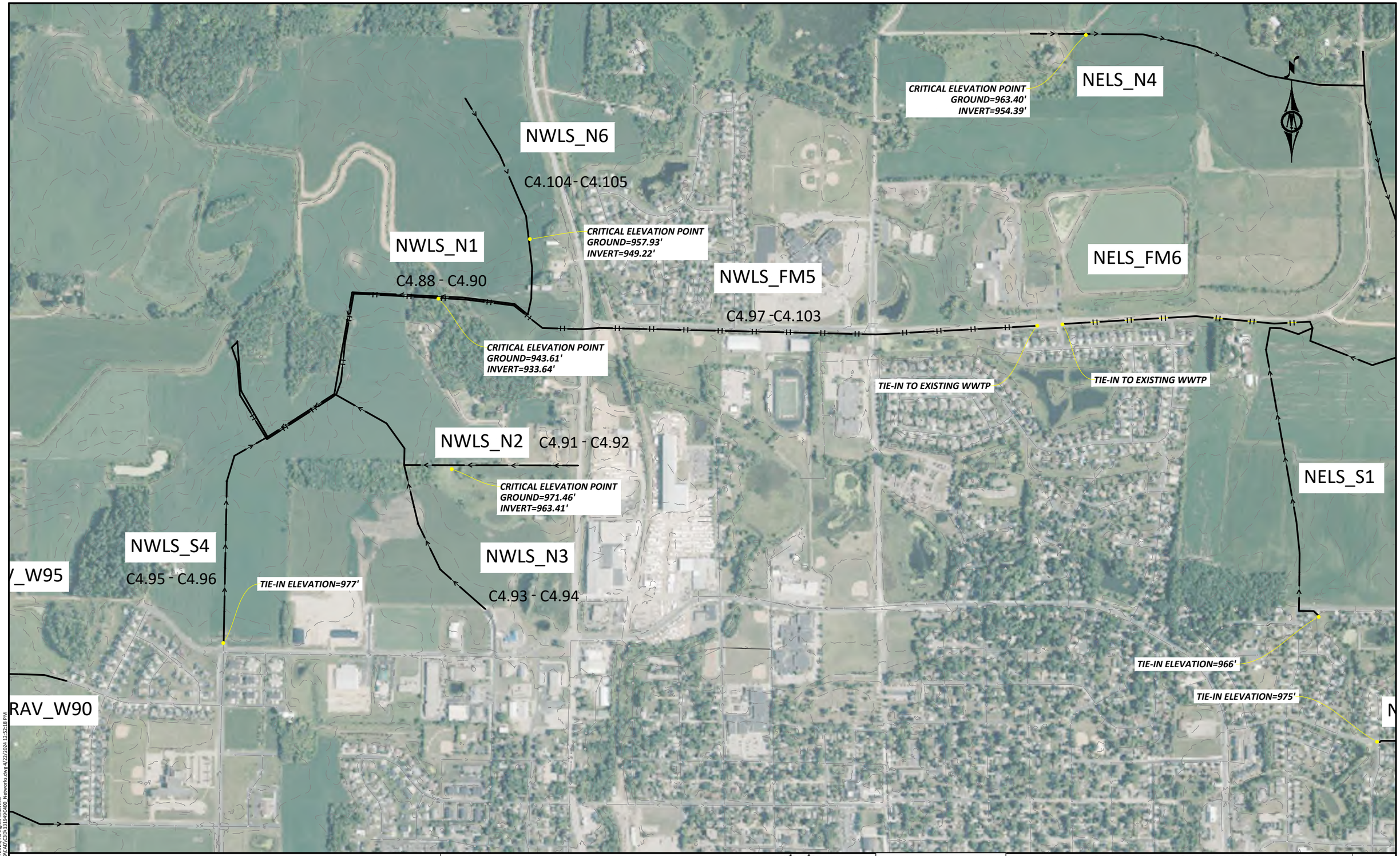
NELS - ALL ALIGNMENTS

SHEET C4.04



HORZ. SCALE 0 400 800 FEET

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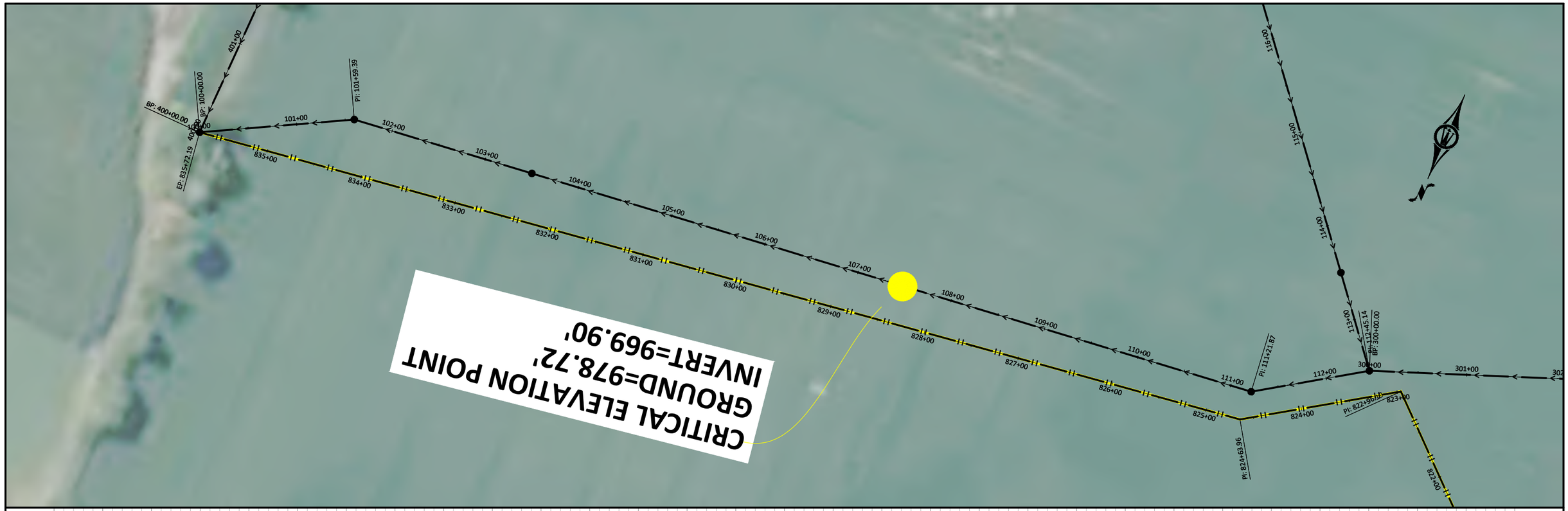
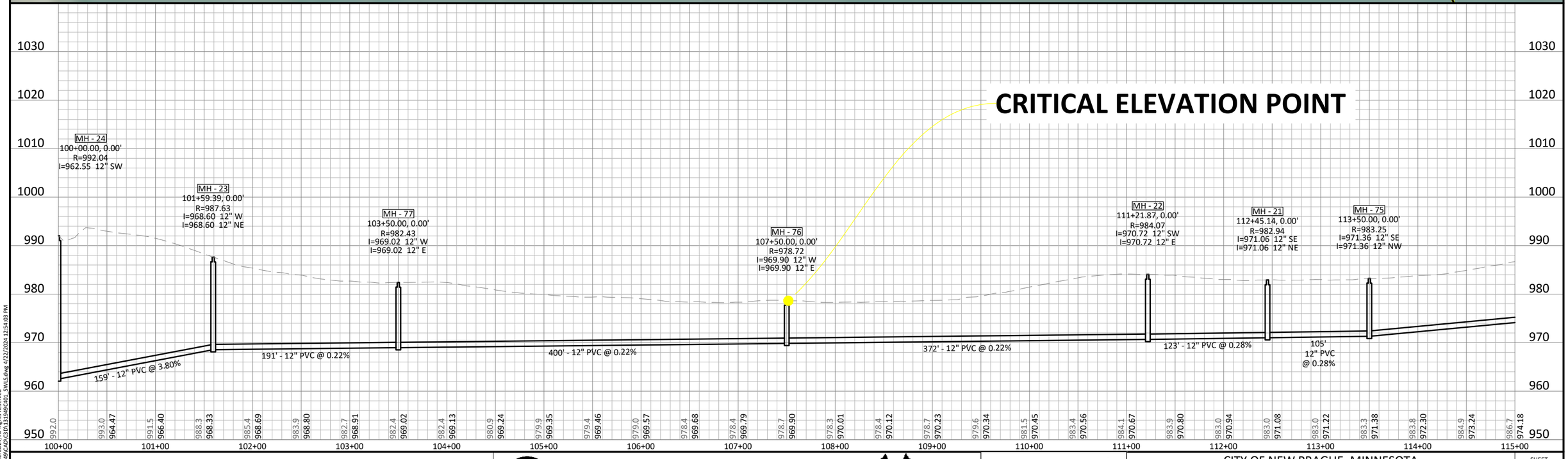
NWLS - ALL ALIGNMENTS

SHEET C4.05





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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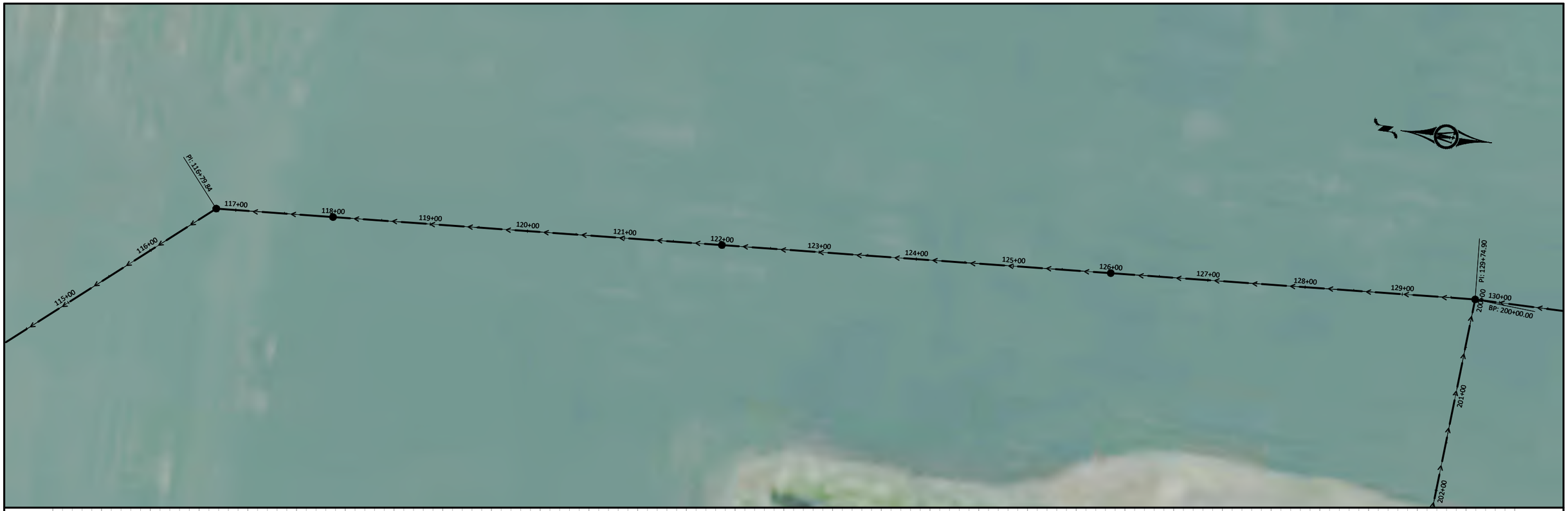
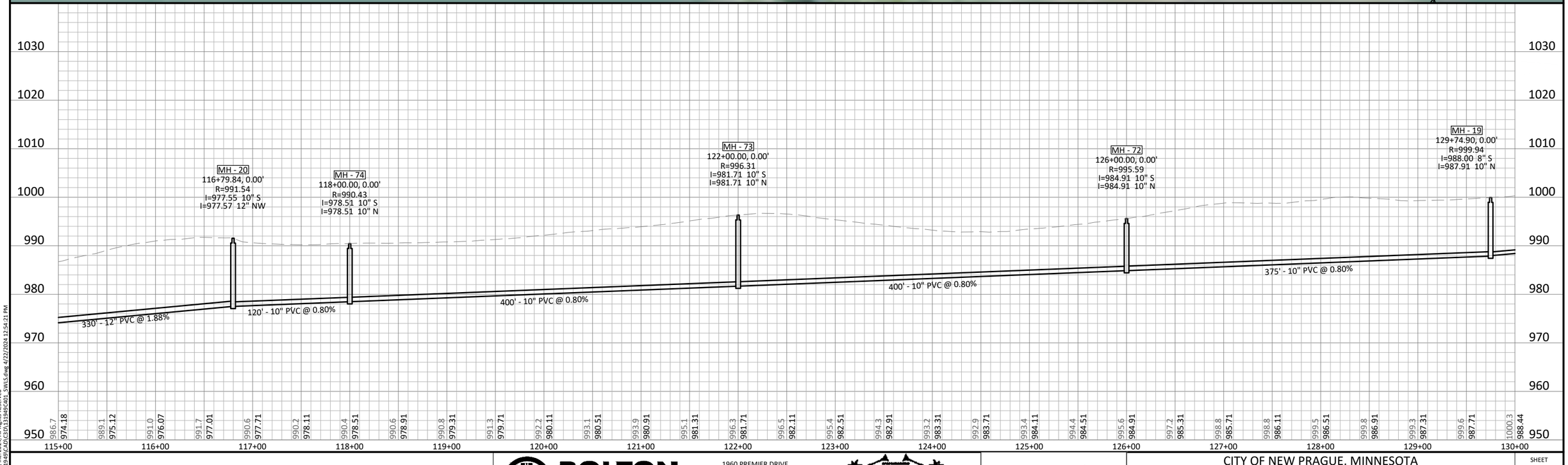
SWLS - S1 ALIGNMENT

SHEET C4.06





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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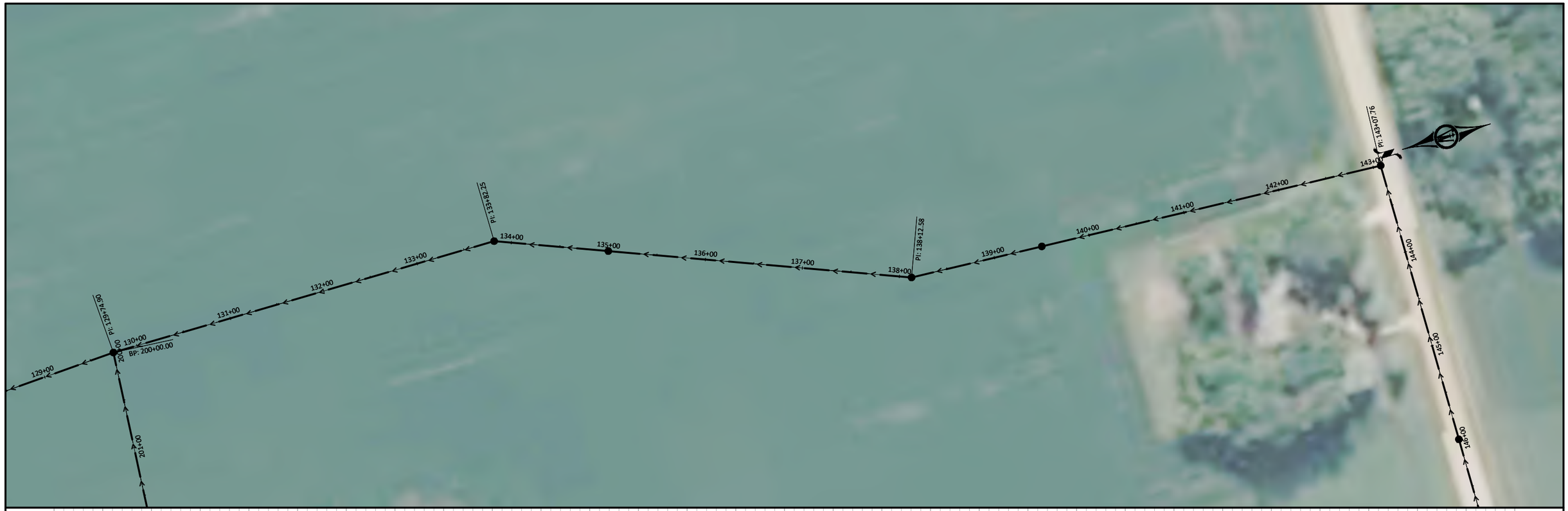
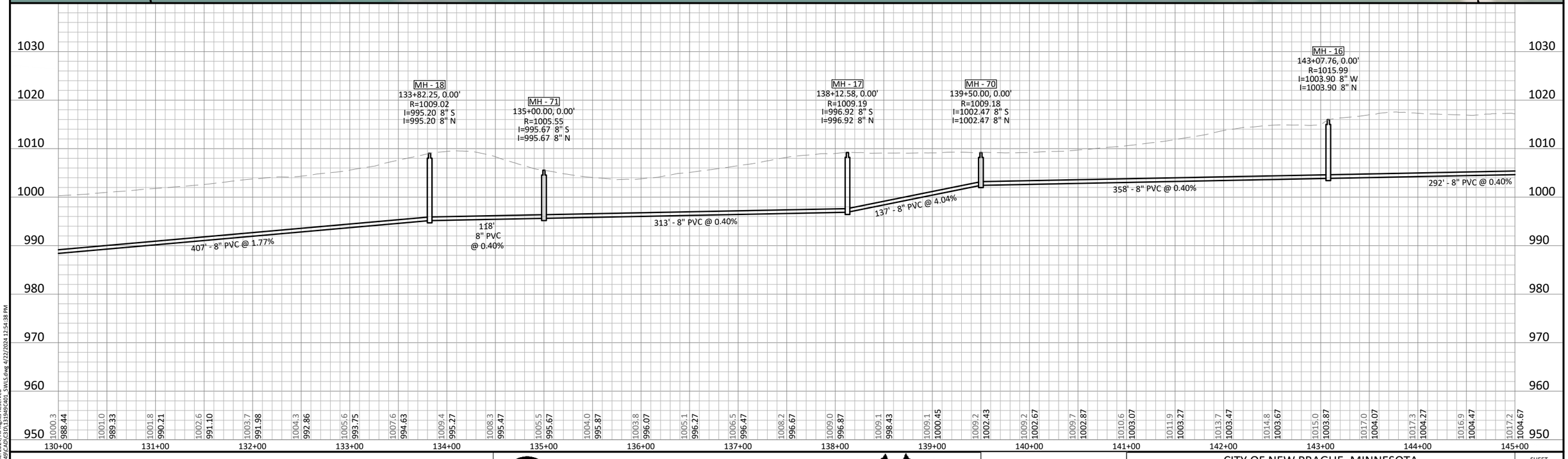
SWLS - S1 ALIGNMENT

SHEET C4.07





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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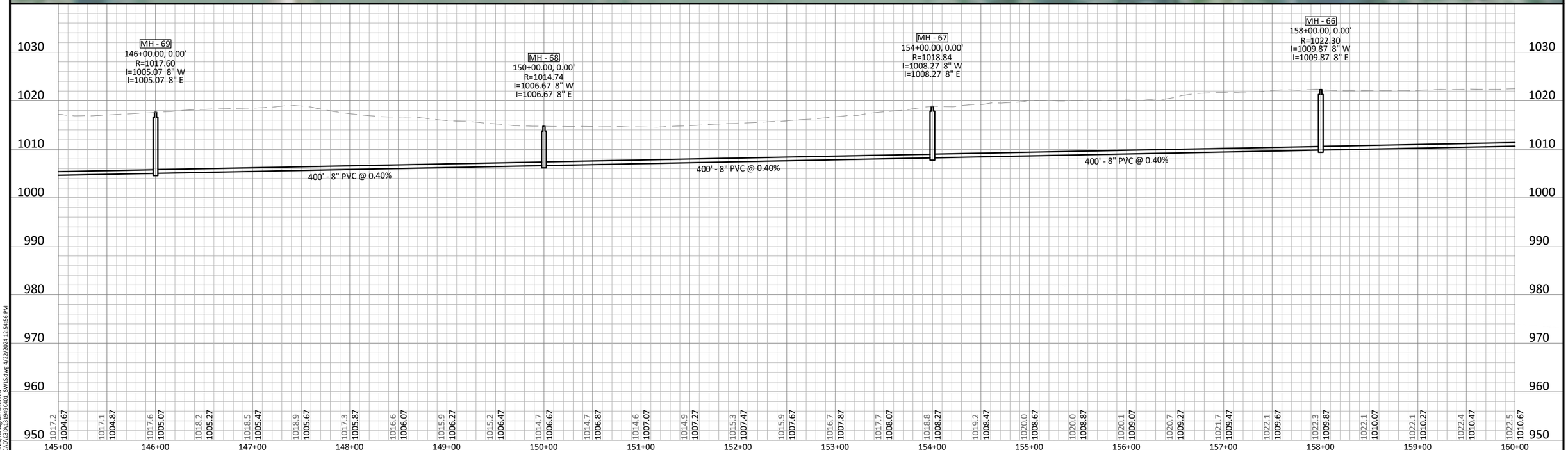
SWLS - S1 ALIGNMENT

SHEET C4.08



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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SWLS - S1 ALIGNMENT

SHEET
C4.09

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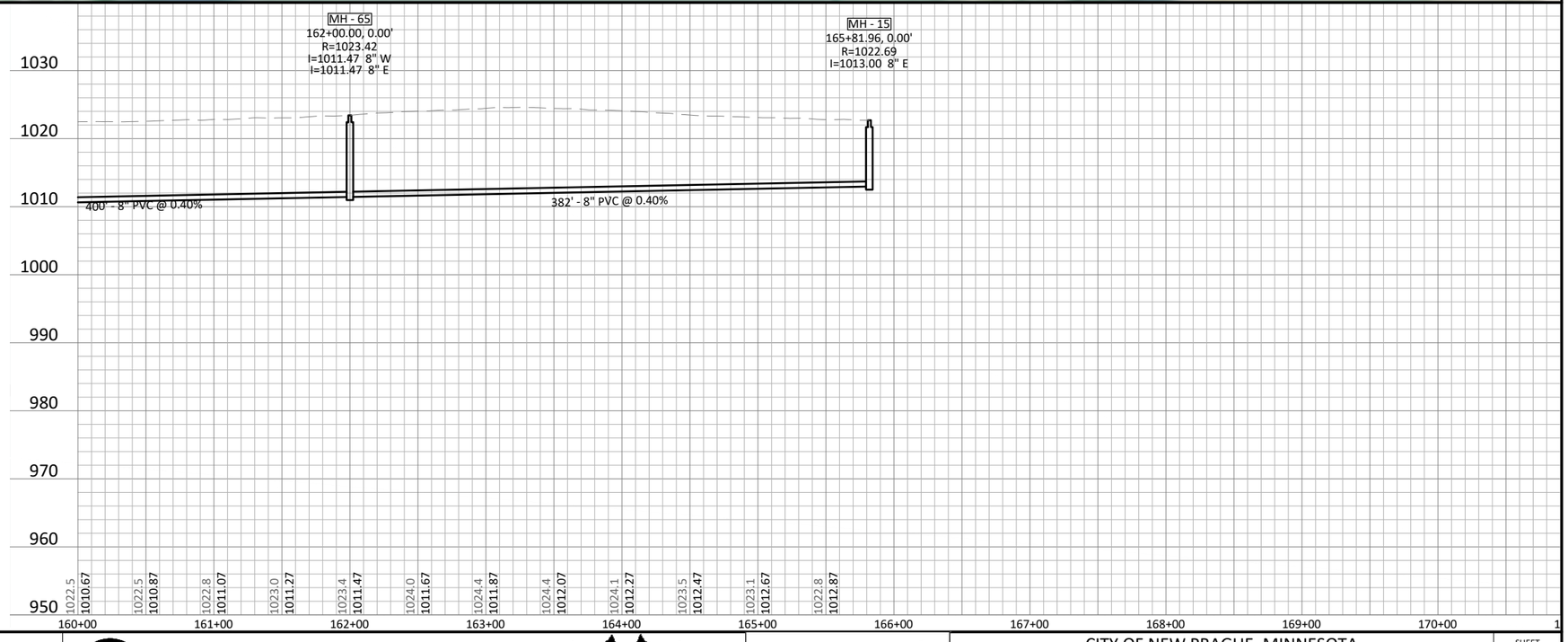

HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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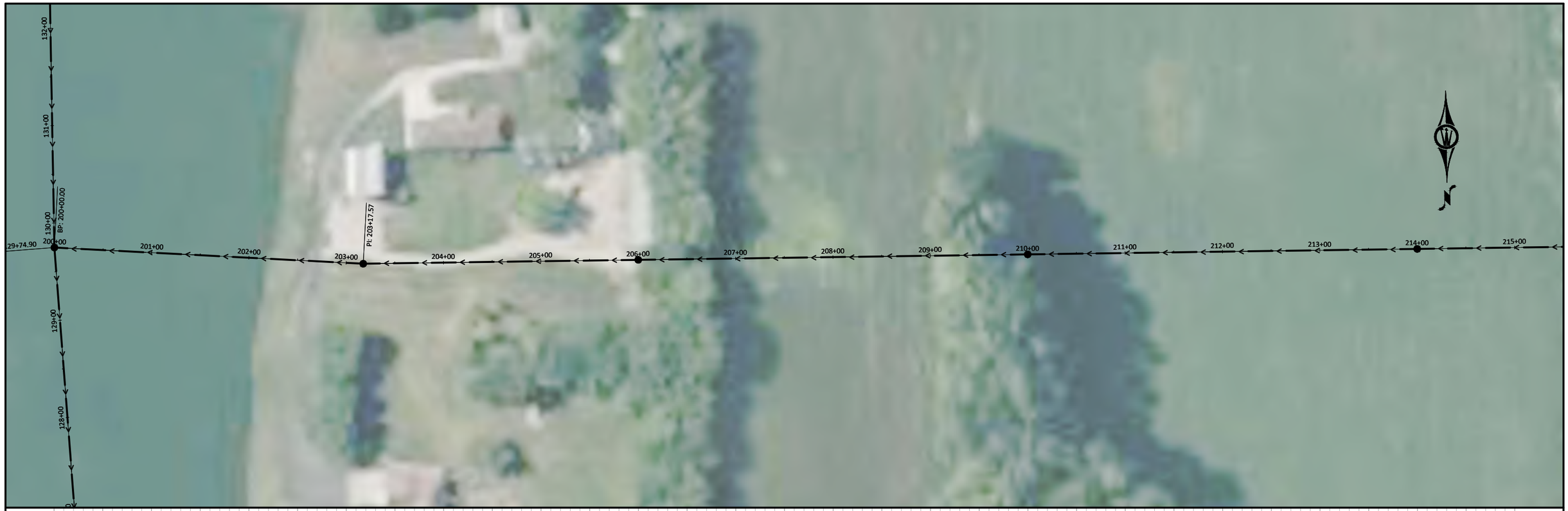
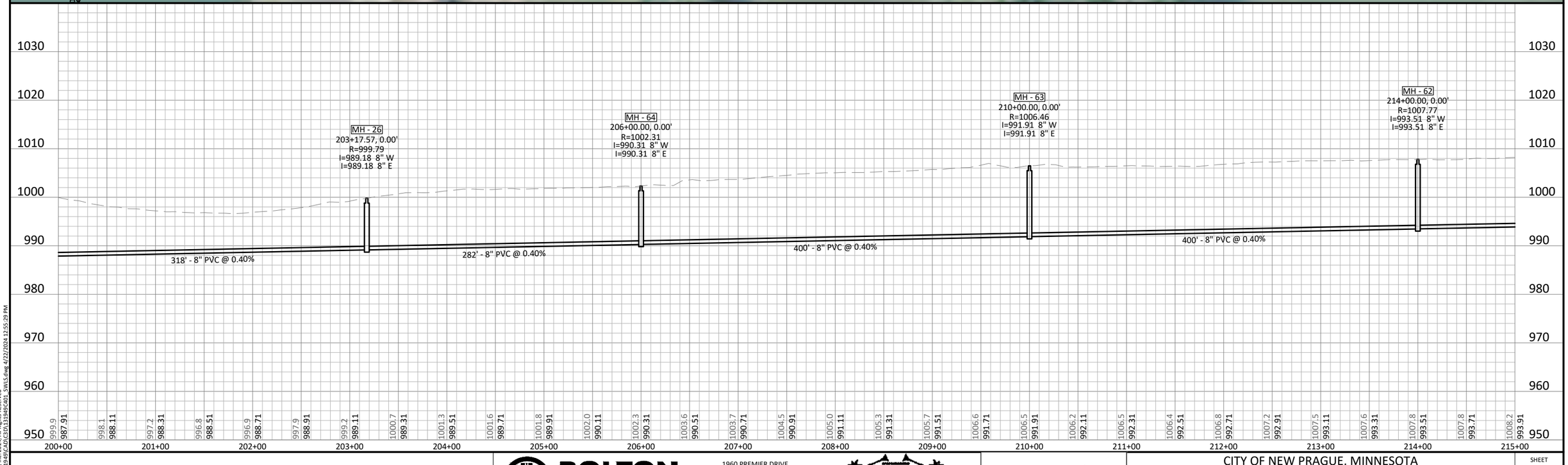
SWLS - S1 ALIGNMENT

SHEET C4.10





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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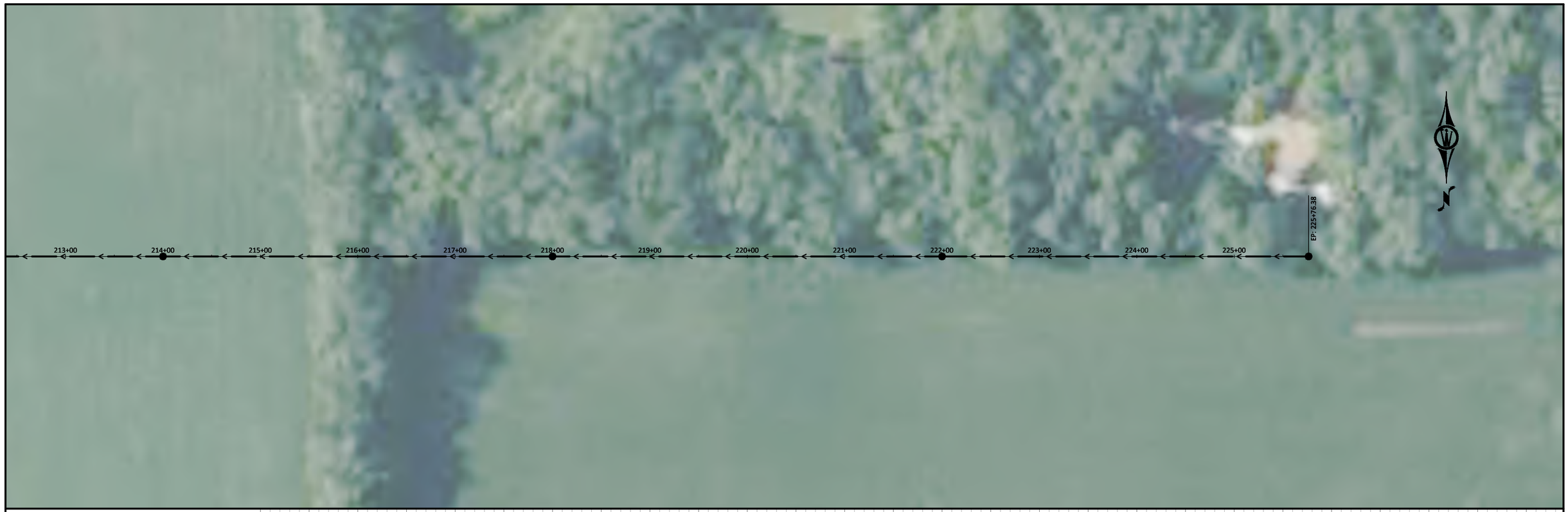
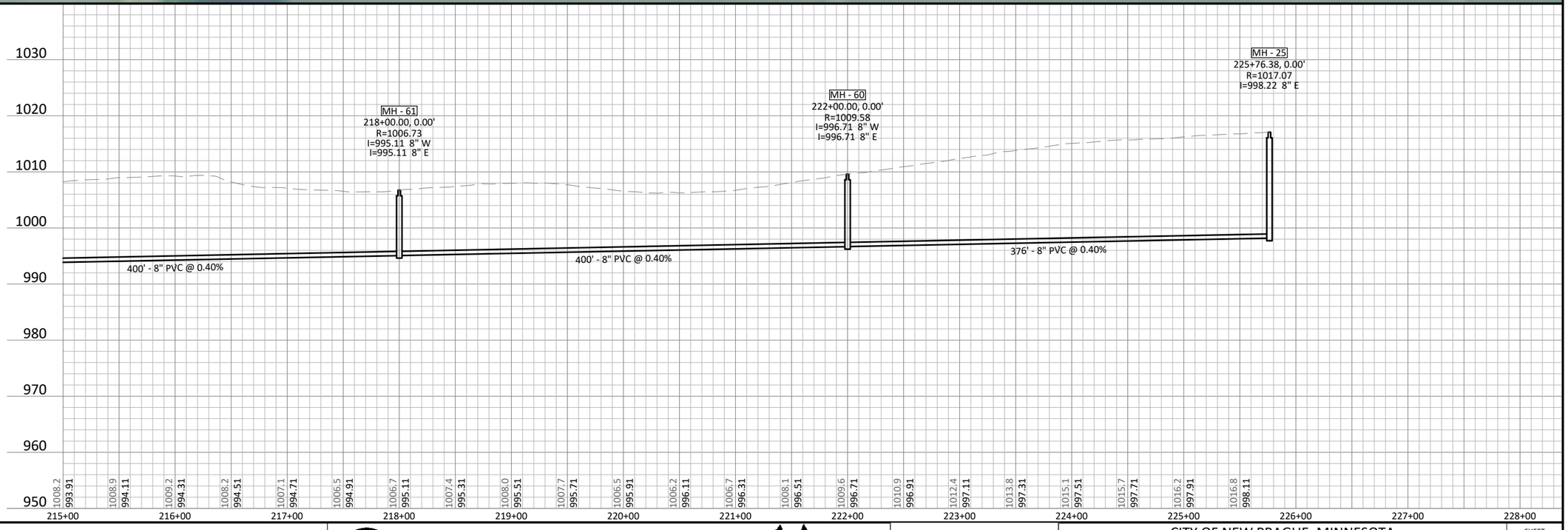
SWLS - S2 ALIGNMENT

SHEET C4.11





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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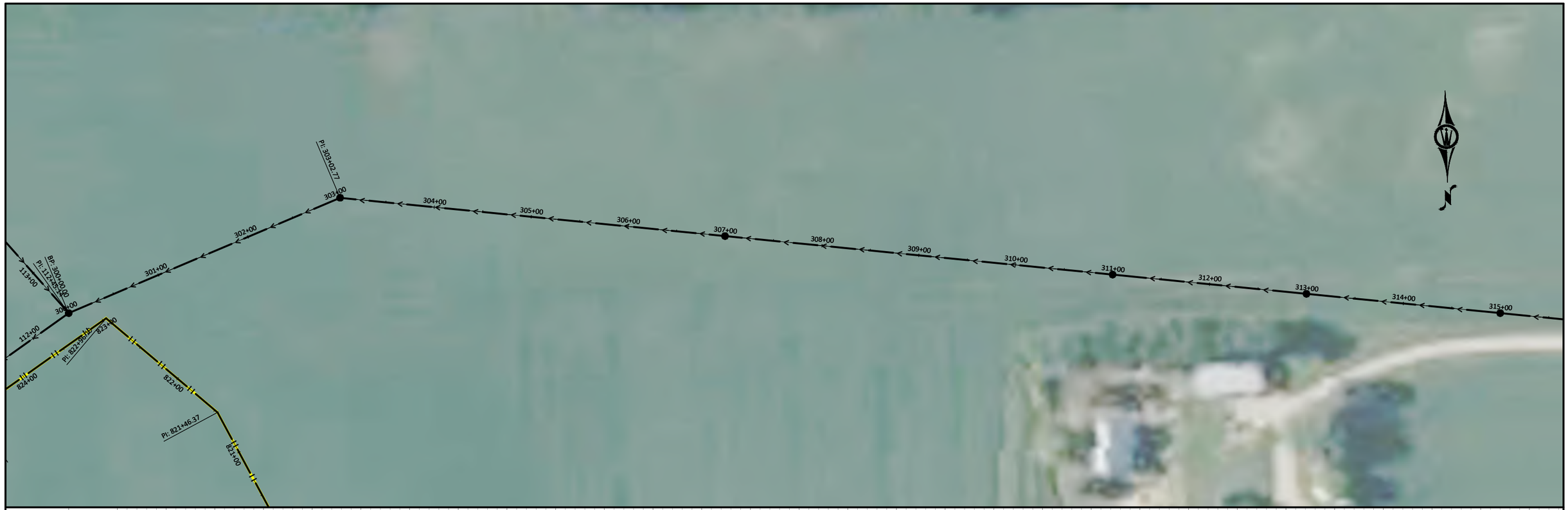
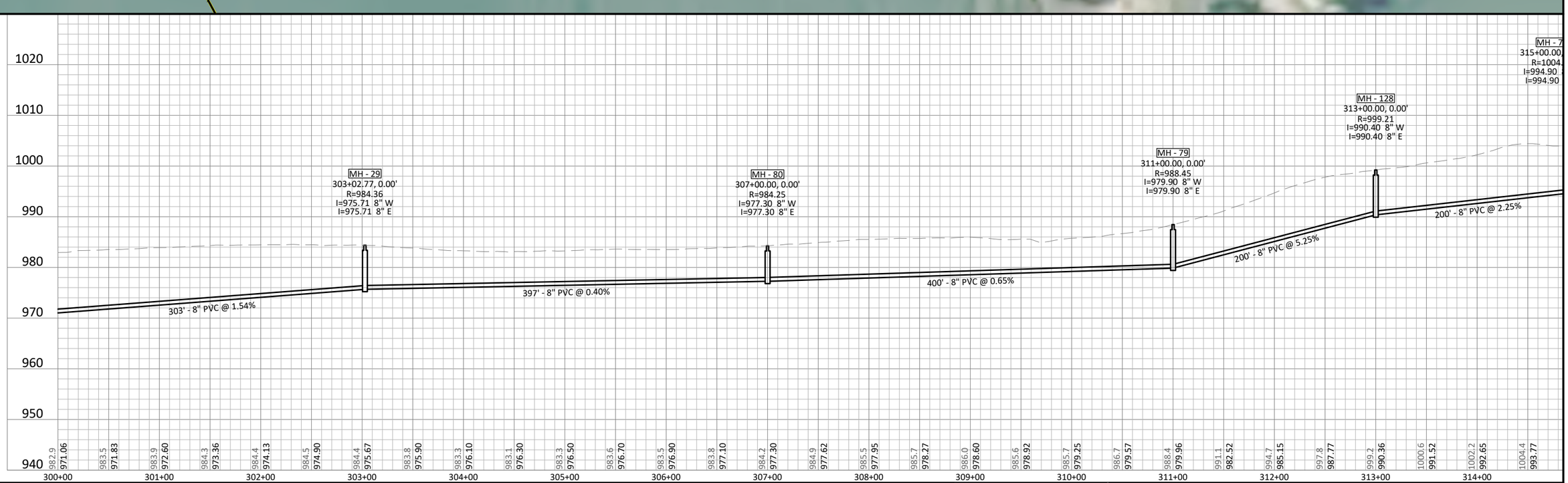
SWLS - S2 ALIGNMENT

SHEET
C4.12





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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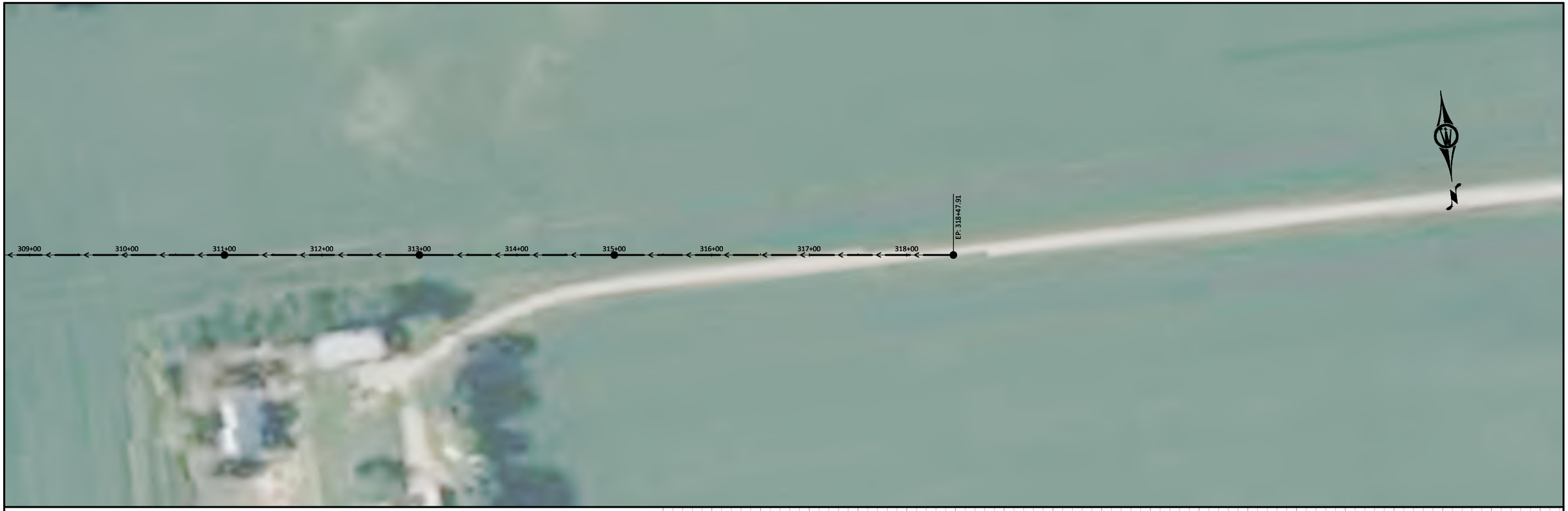
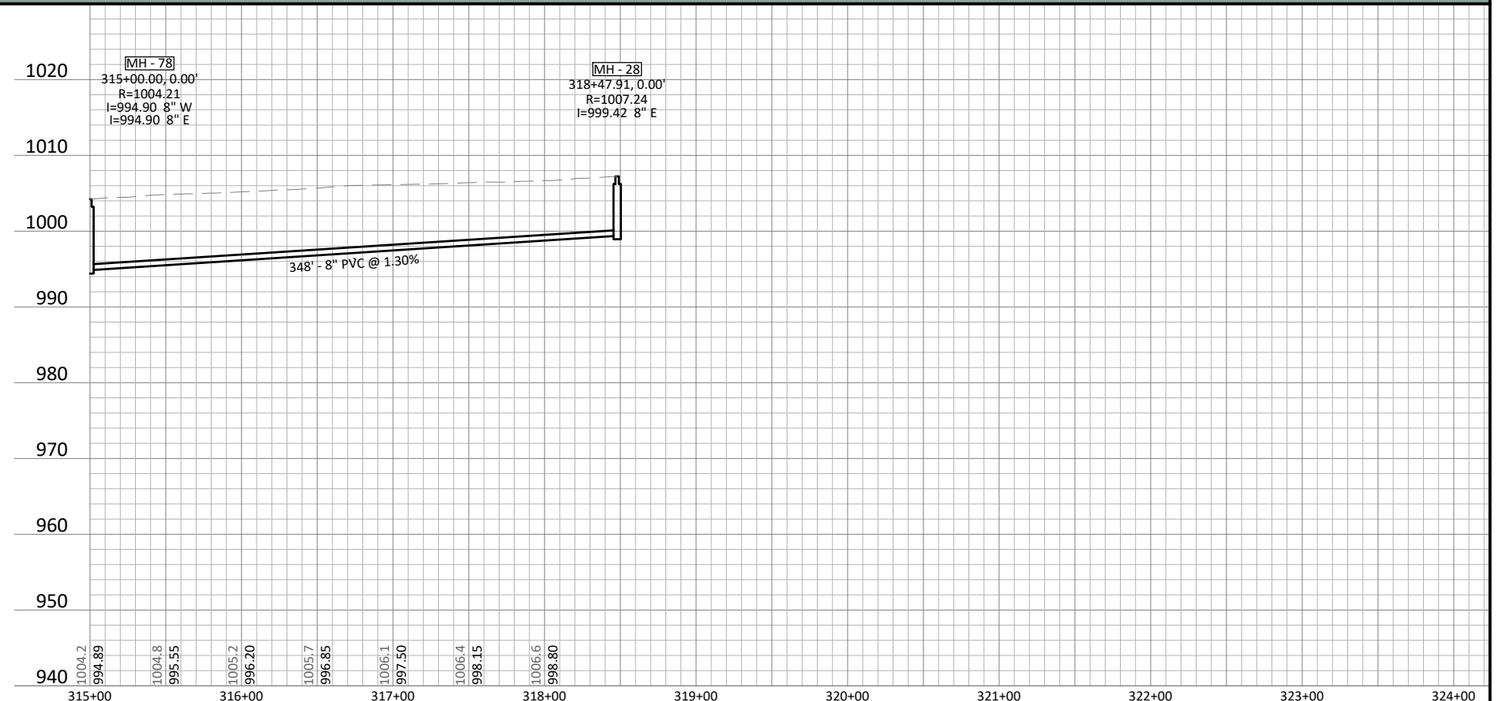
SWLS - S3 ALIGNMENT

SHEET
C4.13





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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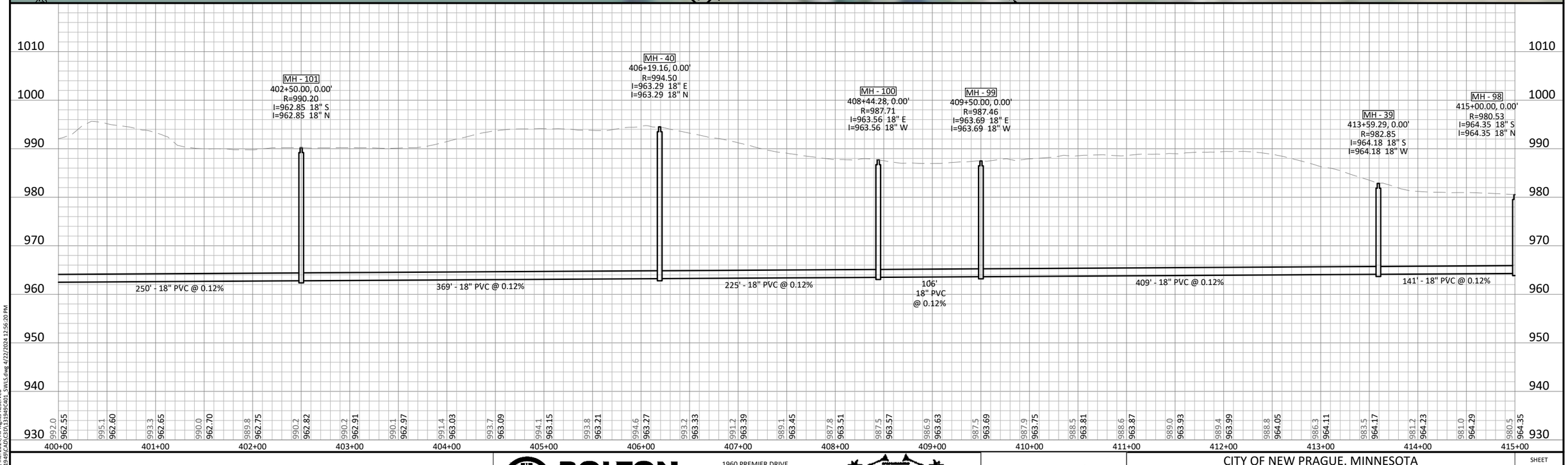
SWLS - S3 ALIGNMENT

SHEET C4.14



HORZ. 0 50 100 SCALE FEET
VERT. 0 10 20 SCALE FEET

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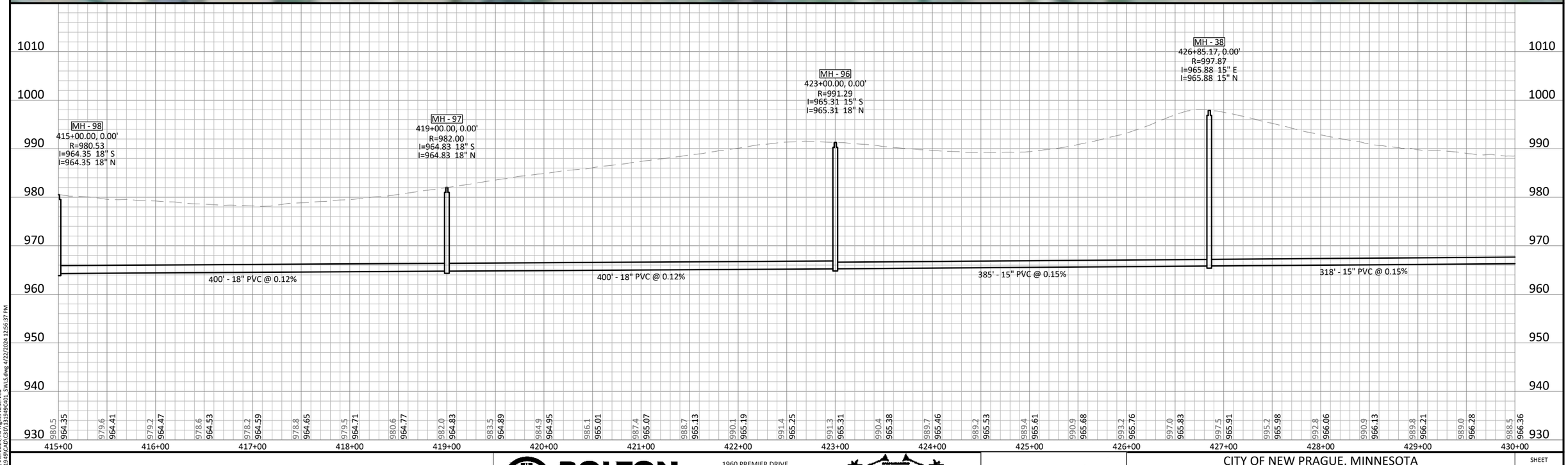
SWLS - S4 ALIGNMENT

SHEET C4.15



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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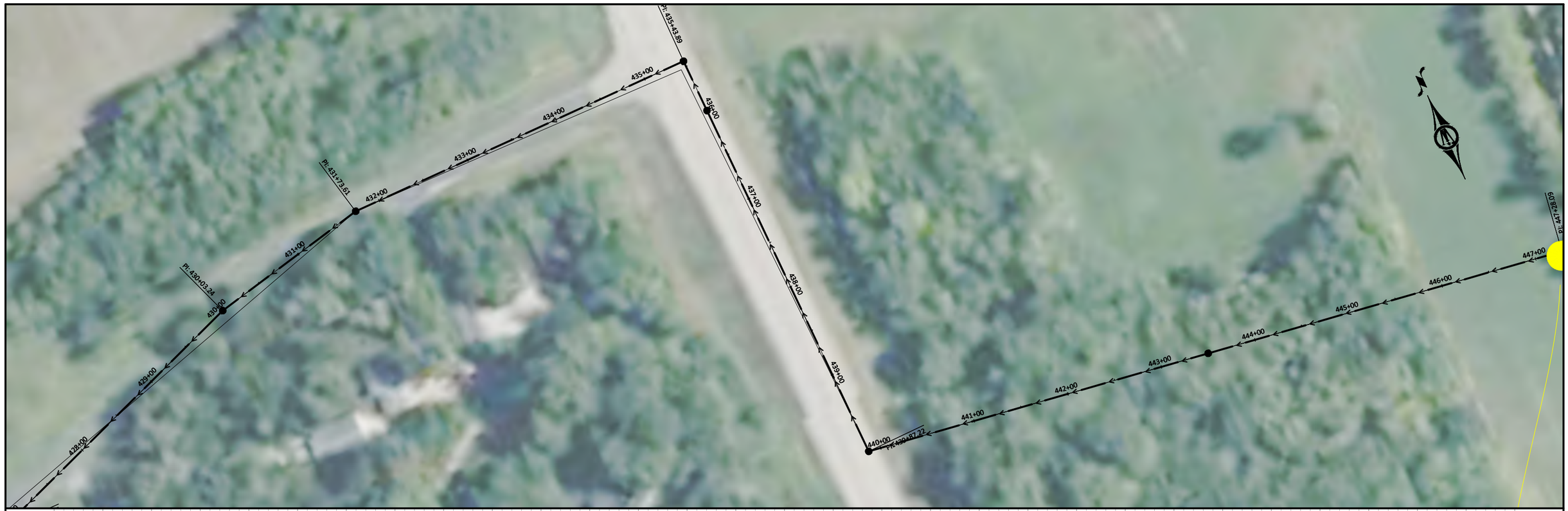
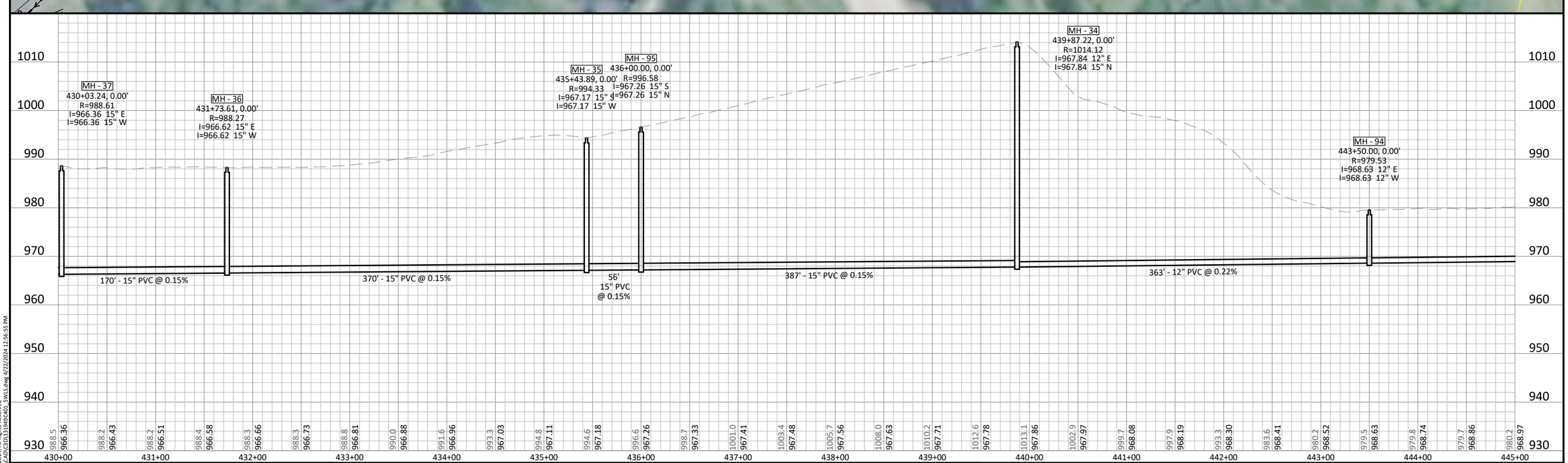
SWLS - S4 ALIGNMENT

SHEET C4.16





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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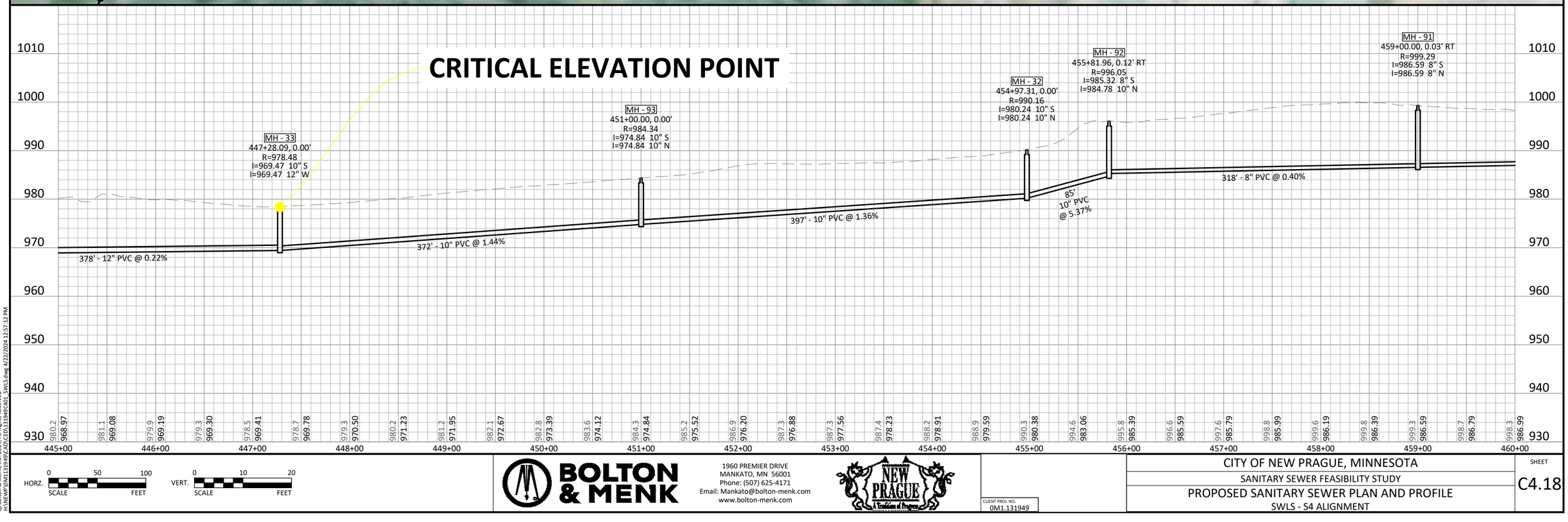
SHEET
C4.17



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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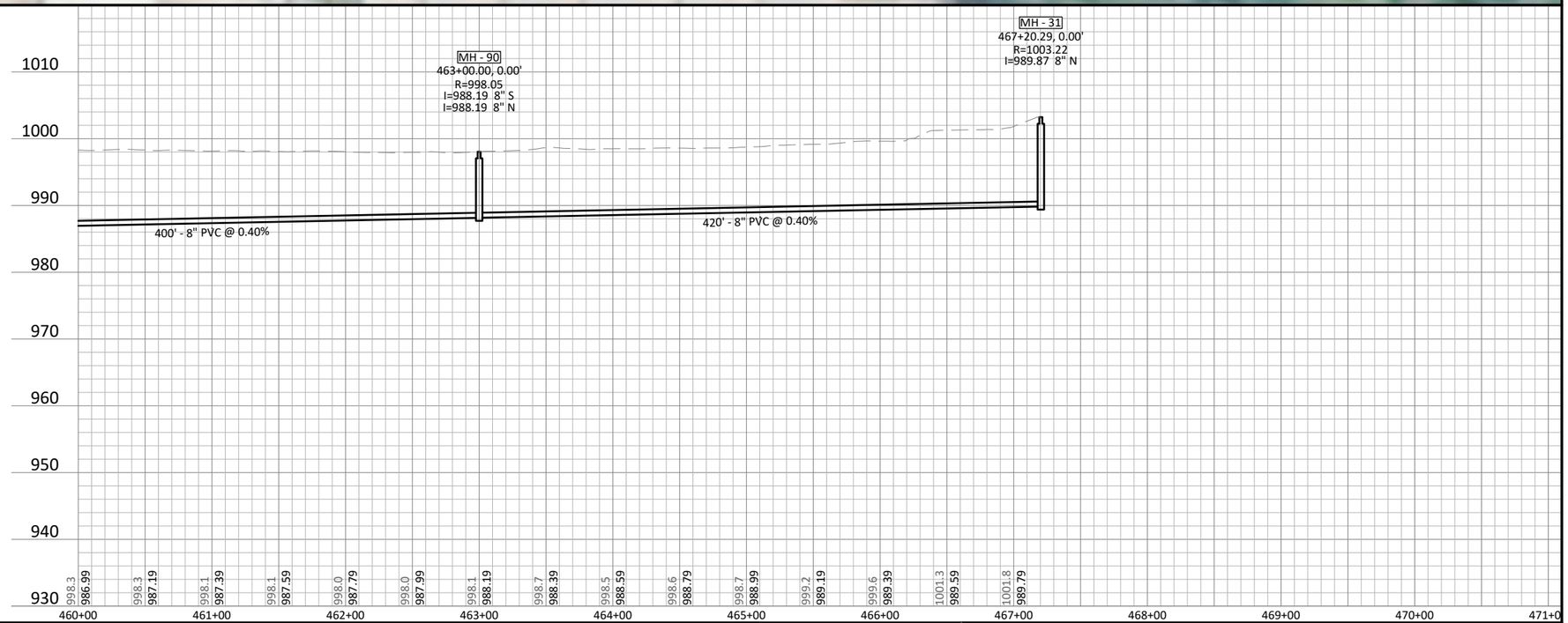
SWLS - S4 ALIGNMENT

SHEET C4.18



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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SHEET
C4.19

CRITICAL ELEVATION POINT

HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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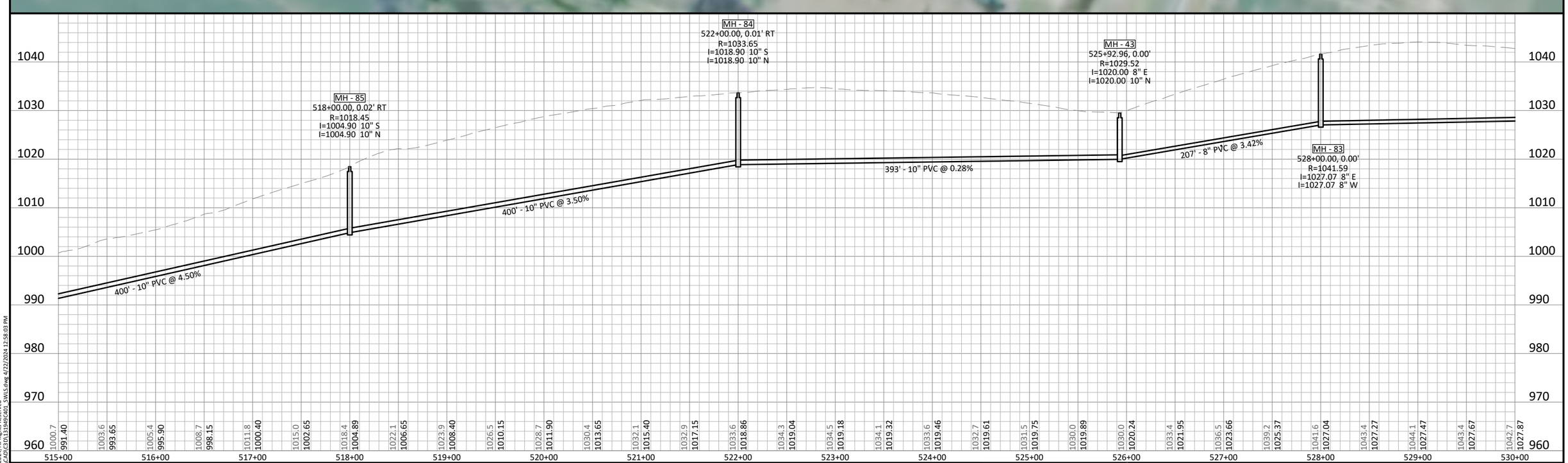
SHEET
C4.20



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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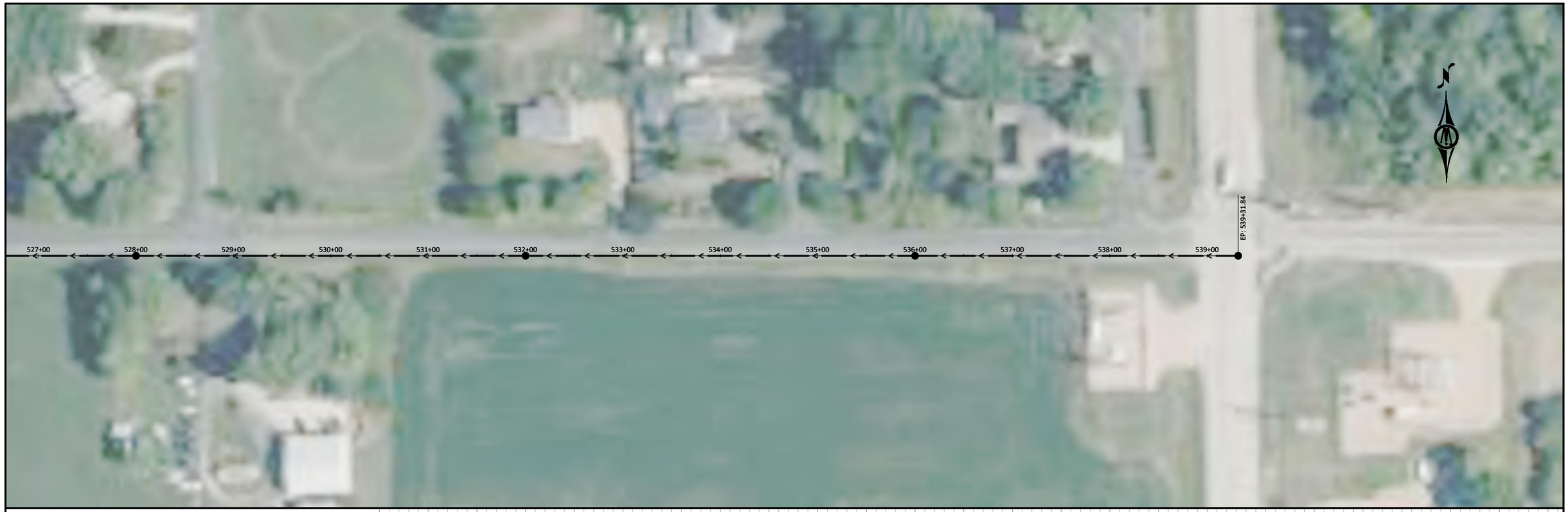
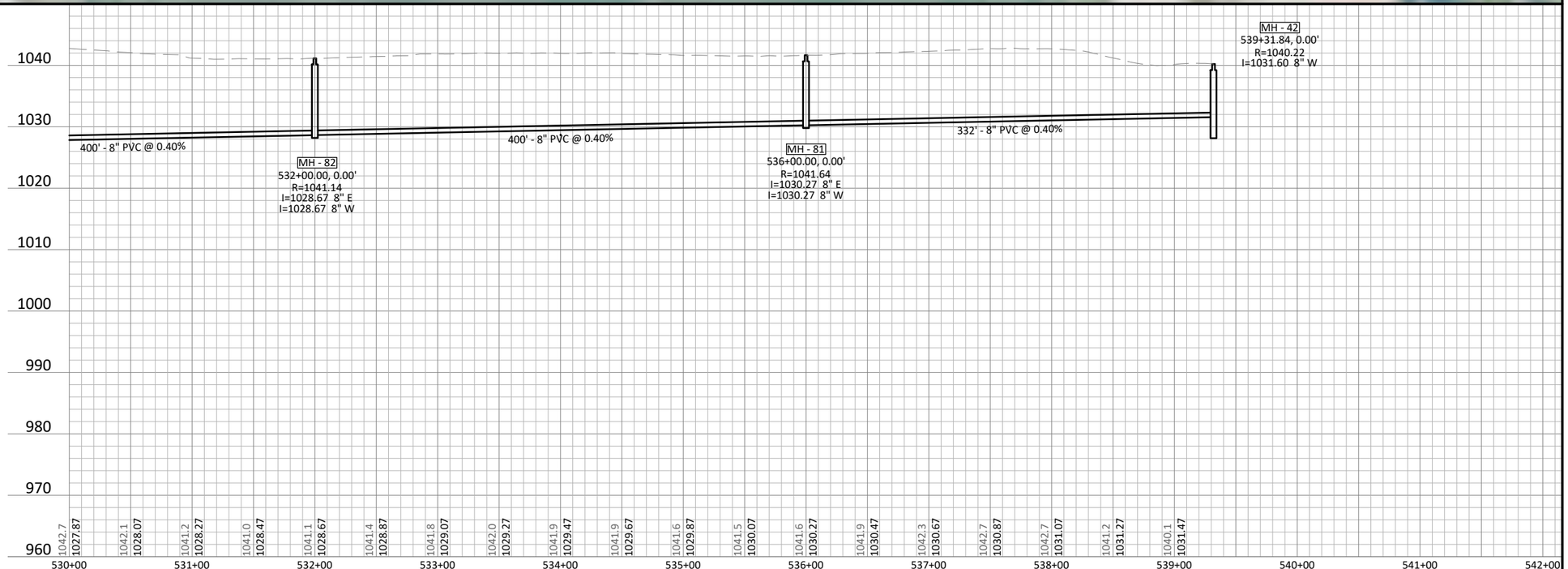
SWLS - S5 ALIGNMENT

SHEET
C4.21





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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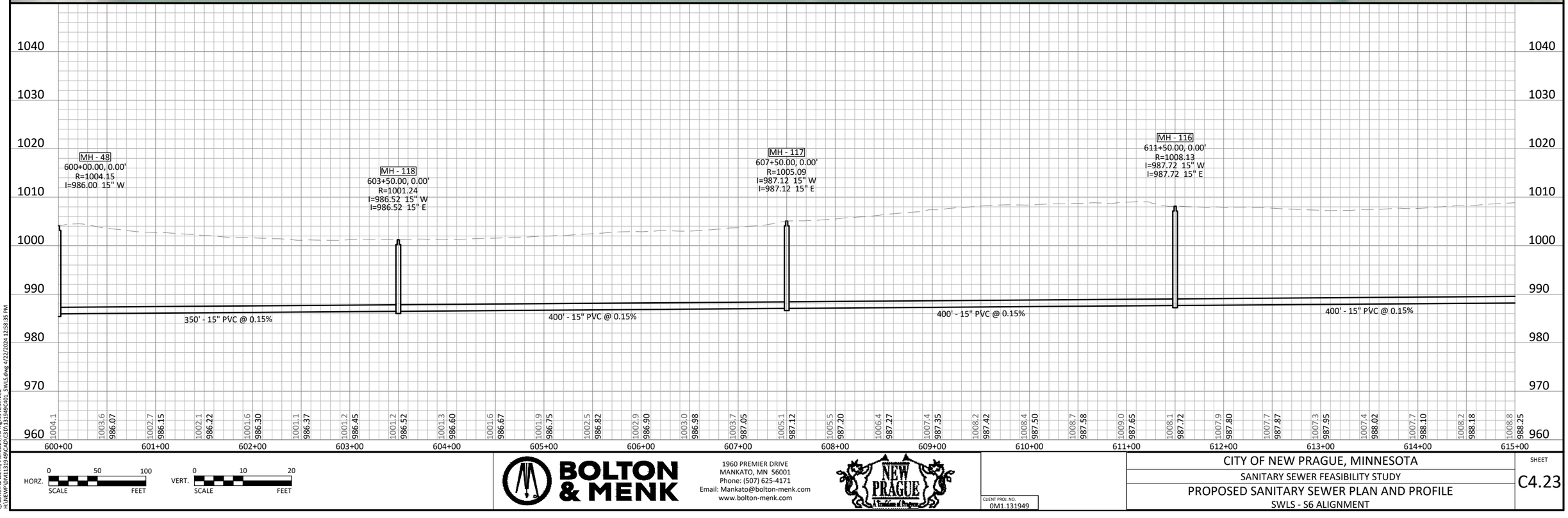
SHEET
C4.22



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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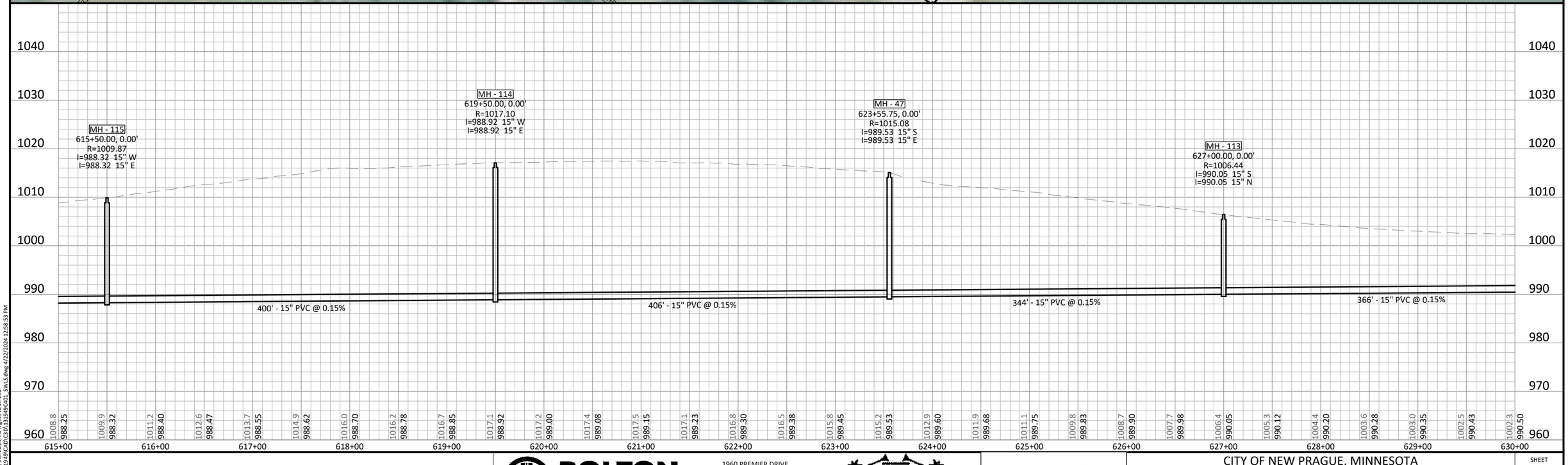
SWLS - S6 ALIGNMENT

SHEET C4.23



HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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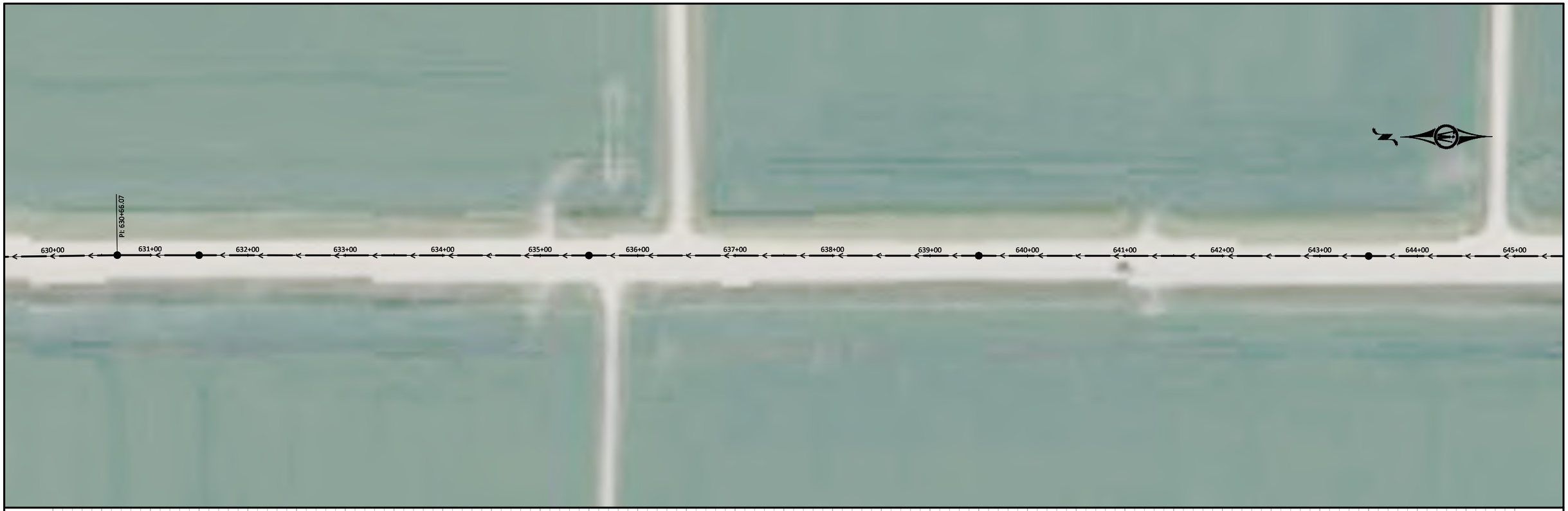
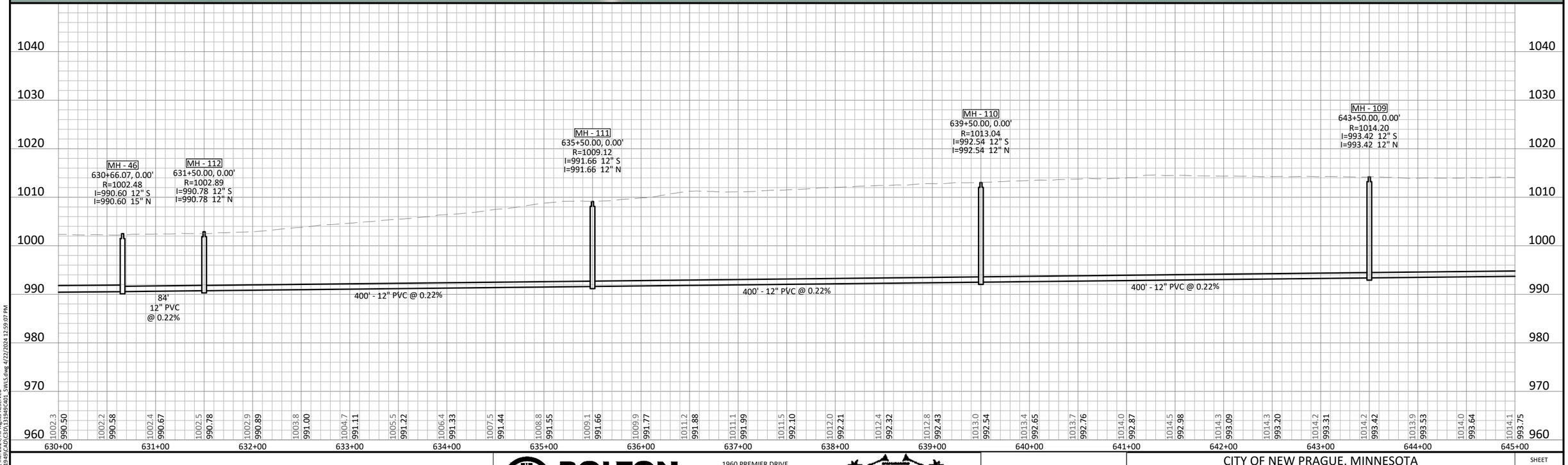
SWLS - S6 ALIGNMENT

SHEET C4.24





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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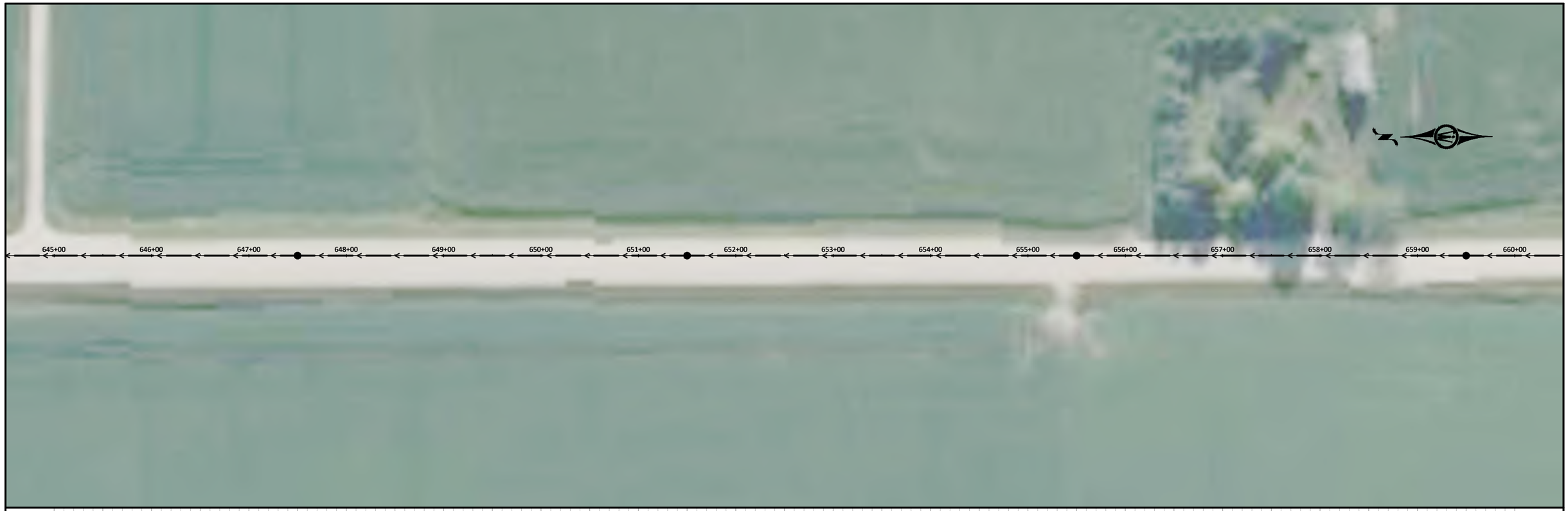
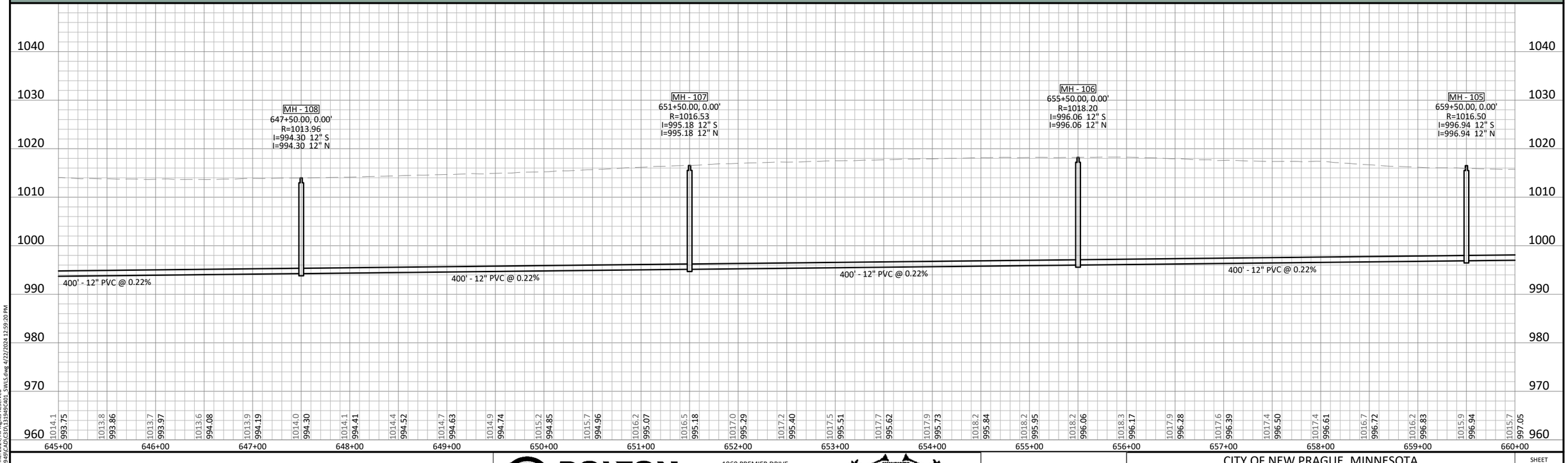
SWLS - S6 ALIGNMENT

SHEET
C4.25





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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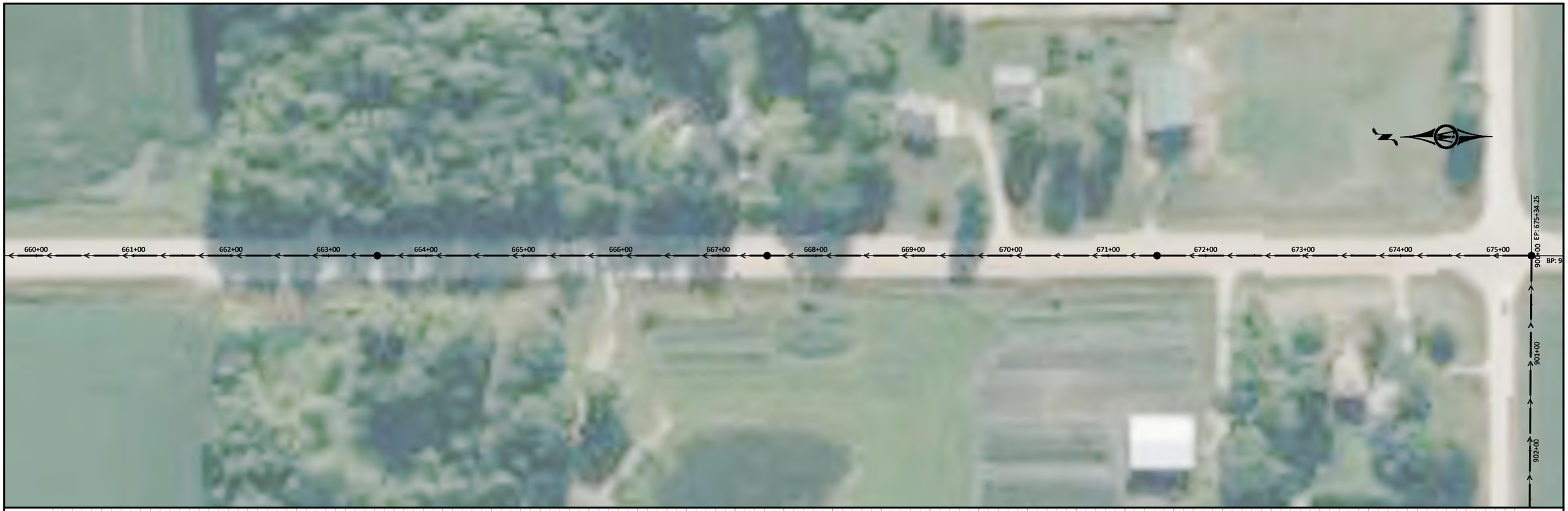
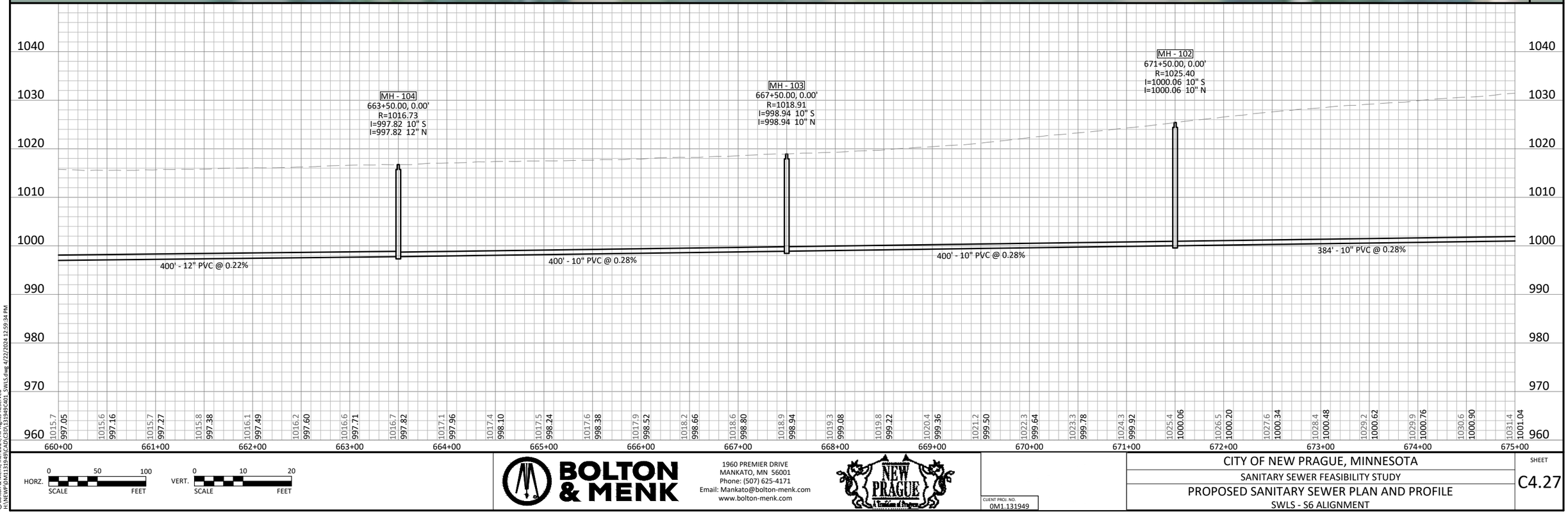
SWLS - S6 ALIGNMENT

SHEET C4.26





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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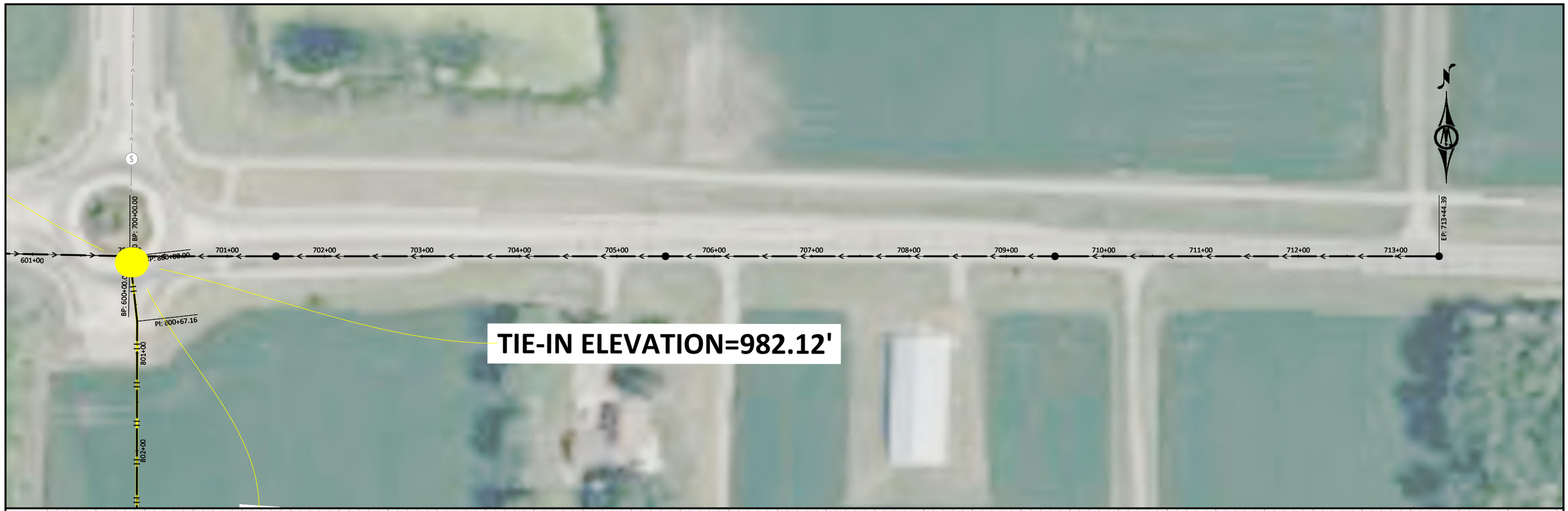
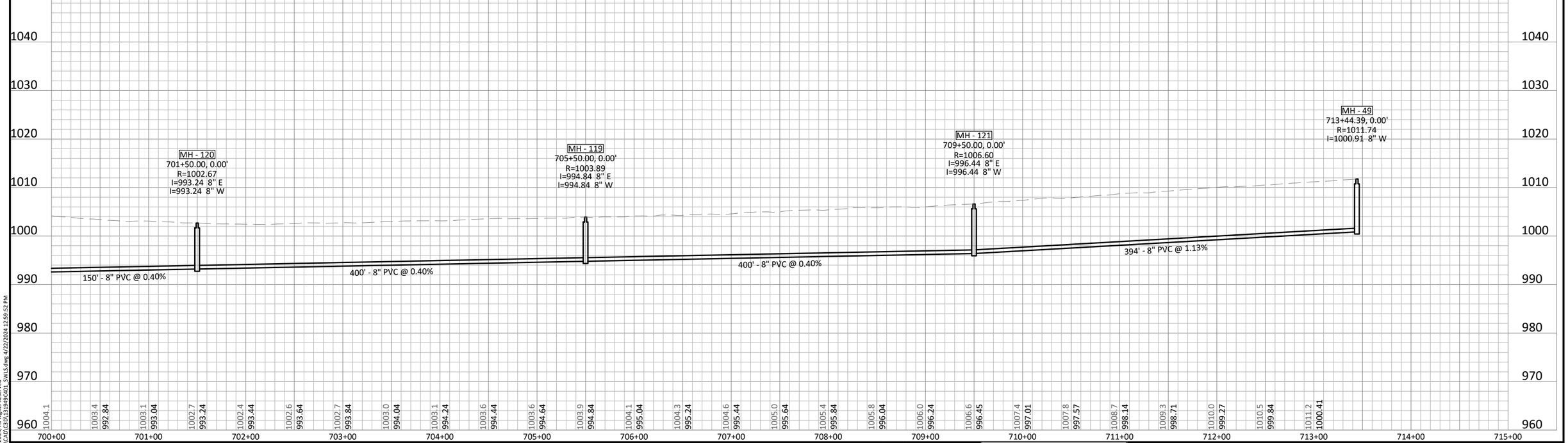
SHEET
C4.27





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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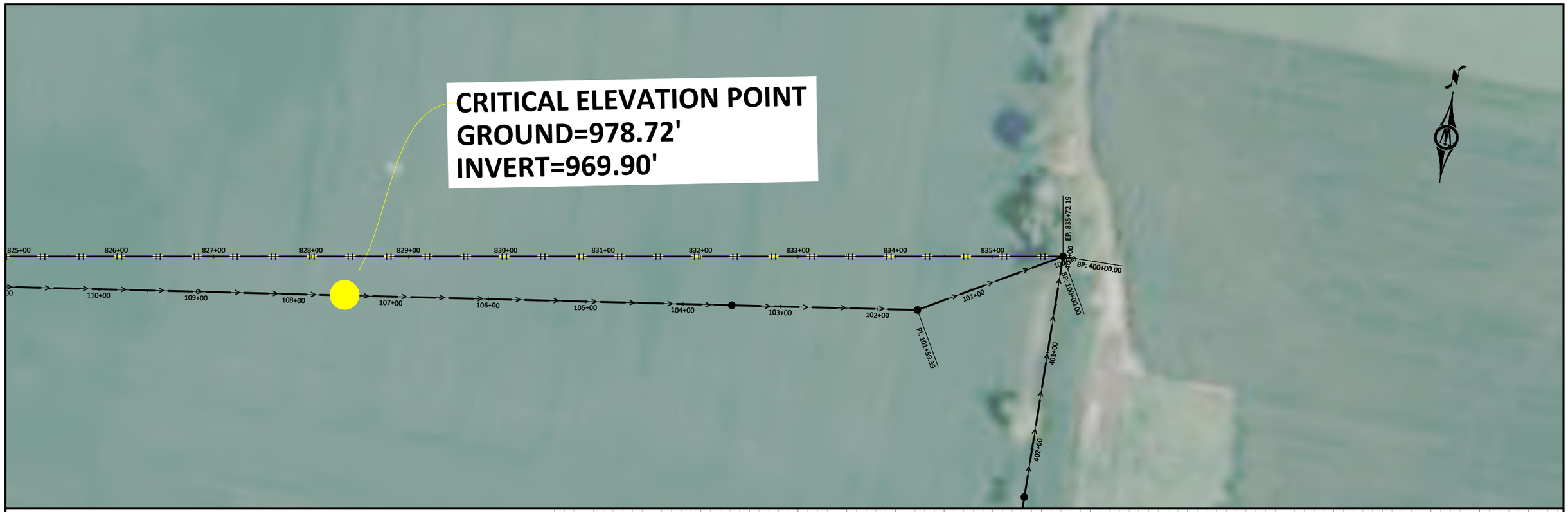
SWLS - S7 ALIGNMENT

SHEET
C4.28



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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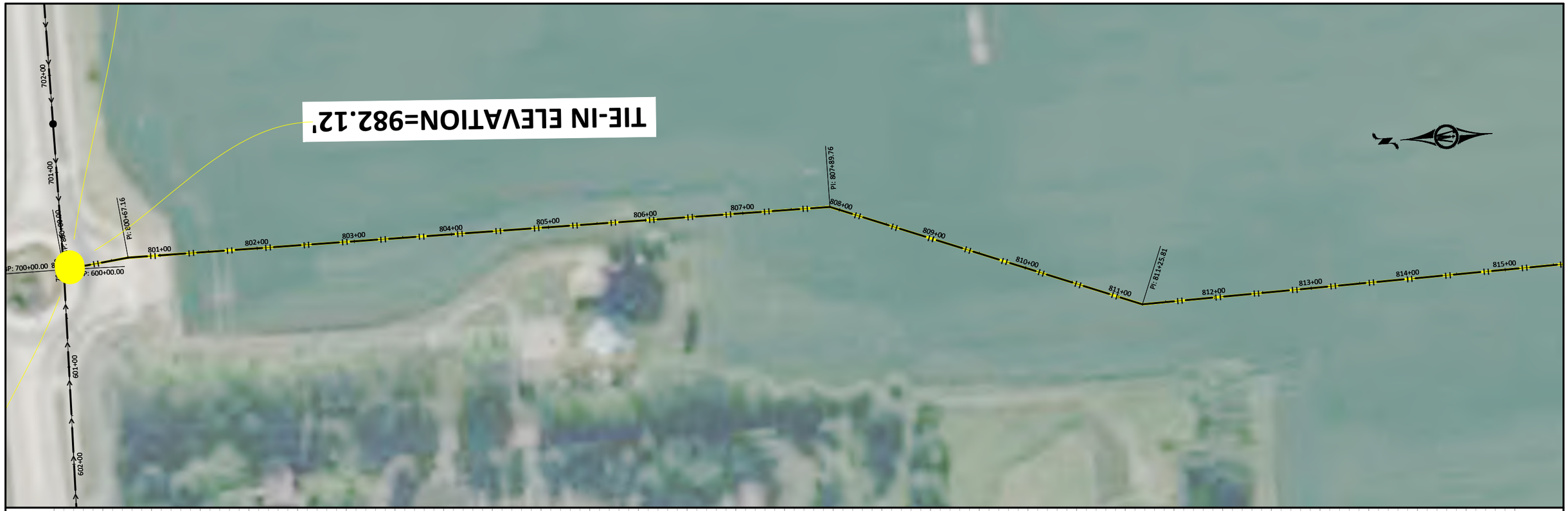
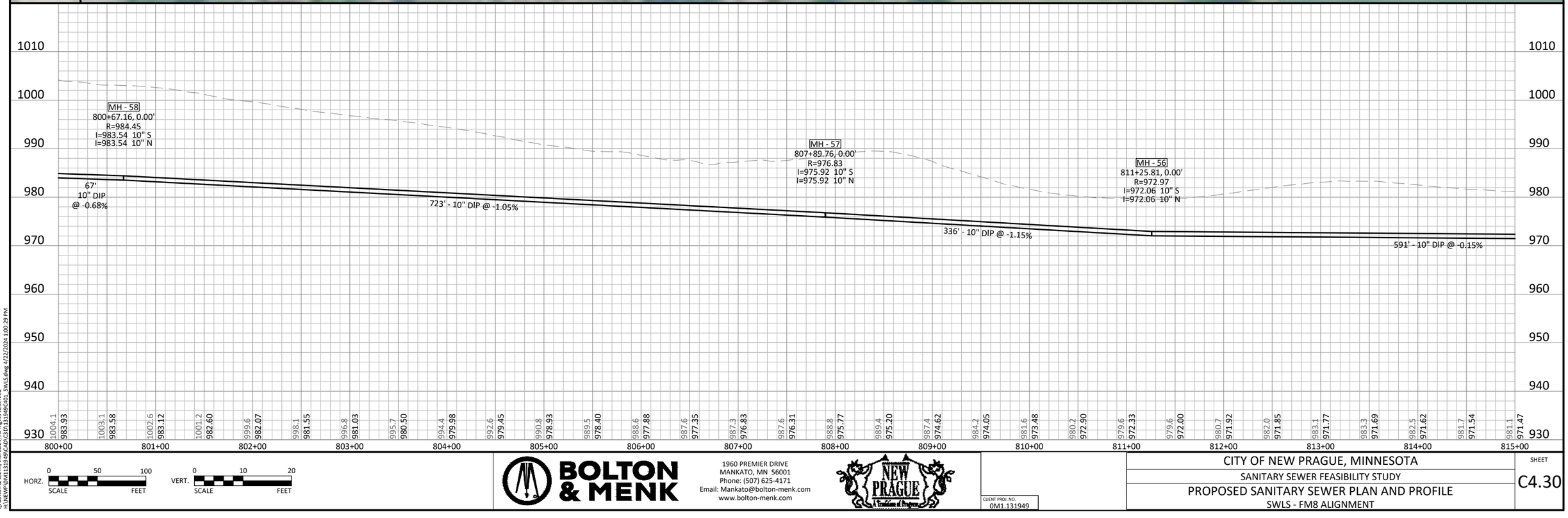
SWLS - FM8 ALIGNMENT

SHEET
C4.29





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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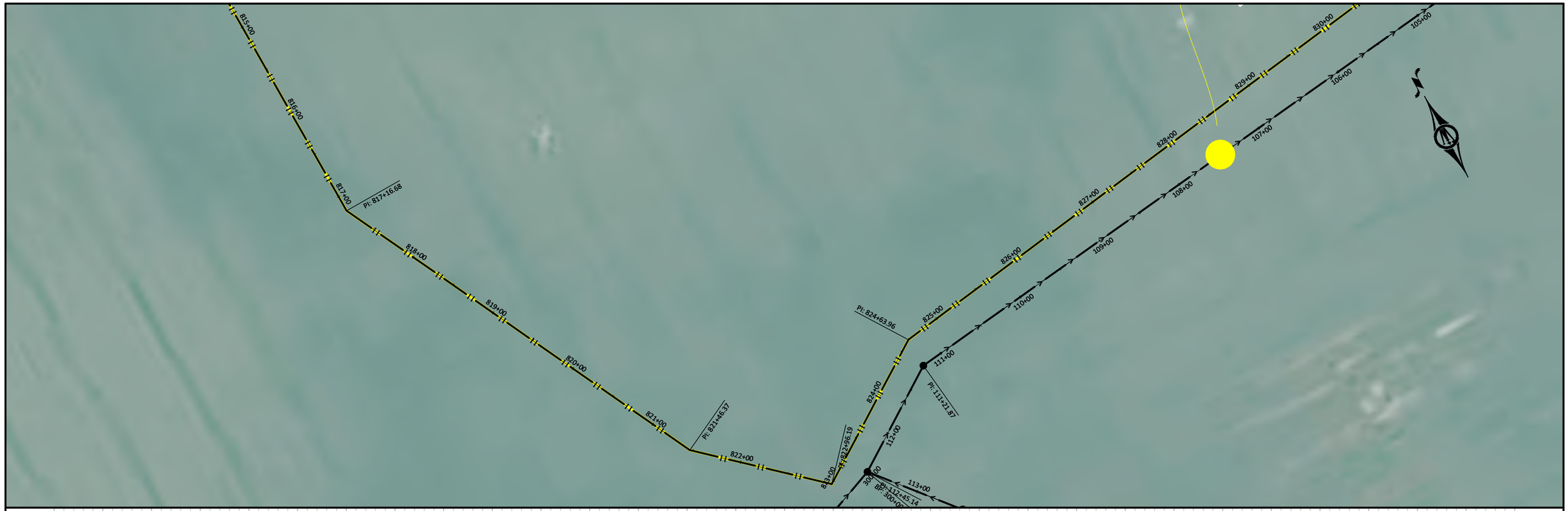
SWLS - FM8 ALIGNMENT

SHEET C4.30



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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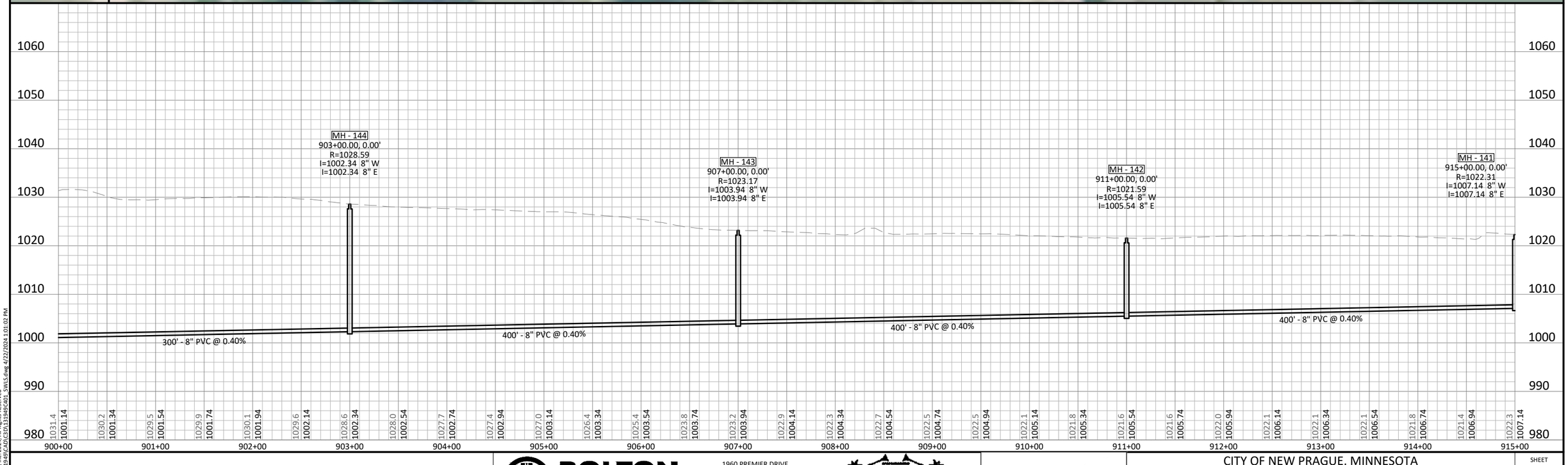
SWLS - FM8 ALIGNMENT

SHEET C4.31



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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SWLS - S9 ALIGNMENT

SHEET C4.32

CRITICAL ELEVATION POINT

MH - 141
915+00.00, 0.00'
R=1022.31
I=1007.14 8" W
I=1007.14 8" E

MH - 140
919+00.00, 0.00'
R=1022.29
I=1008.74 8" W
I=1008.74 8" E

MH - 139
923+00.00, 0.00'
R=1021.54
I=1010.34 8" W
I=1010.34 8" E

MH - 138
926+56.37, 0.00'
R=1017.57
I=1011.76 8" S
I=1011.76 8" E

MH - 137
928+00.00, 0.00'
R=1018.92
I=1012.34 8" S
I=1012.34 8" N

400' - 8" PVC @ 0.40%
400' - 8" PVC @ 0.40%
356' - 8" PVC @ 0.40%
144' - 8" PVC @ 0.40%

1060 1050 1040 1030 1020 1010 1000 990 980

915+00 916+00 917+00 918+00 919+00 920+00 921+00 922+00 923+00 924+00 925+00 926+00 927+00 928+00 929+00 930+00

1022.3	1021.8	1021.6	1021.5	1021.7	1021.9	1022.1	1022.3	1022.3	1022.4	1022.4	1022.6	1022.5	1022.3	1022.1	1021.5	1020.9	1020.2	1019.7	1019.3	1019.0	1018.5	1017.8	1017.8	1018.5	1018.9	1019.5	1020.1	1020.8	1021.6
1007.14	1007.34	1007.54	1007.74	1007.94	1008.14	1008.34	1008.54	1008.74	1008.94	1009.14	1009.34	1009.54	1009.74	1009.94	1010.14	1010.34	1010.54	1010.74	1010.94	1011.14	1011.34	1011.54	1011.74	1011.94	1012.14	1012.34	1012.54	1012.74	1012.94	1013.14

HORZ. 0 50 100 SCALE FEET
VERT. 0 10 20 SCALE FEET

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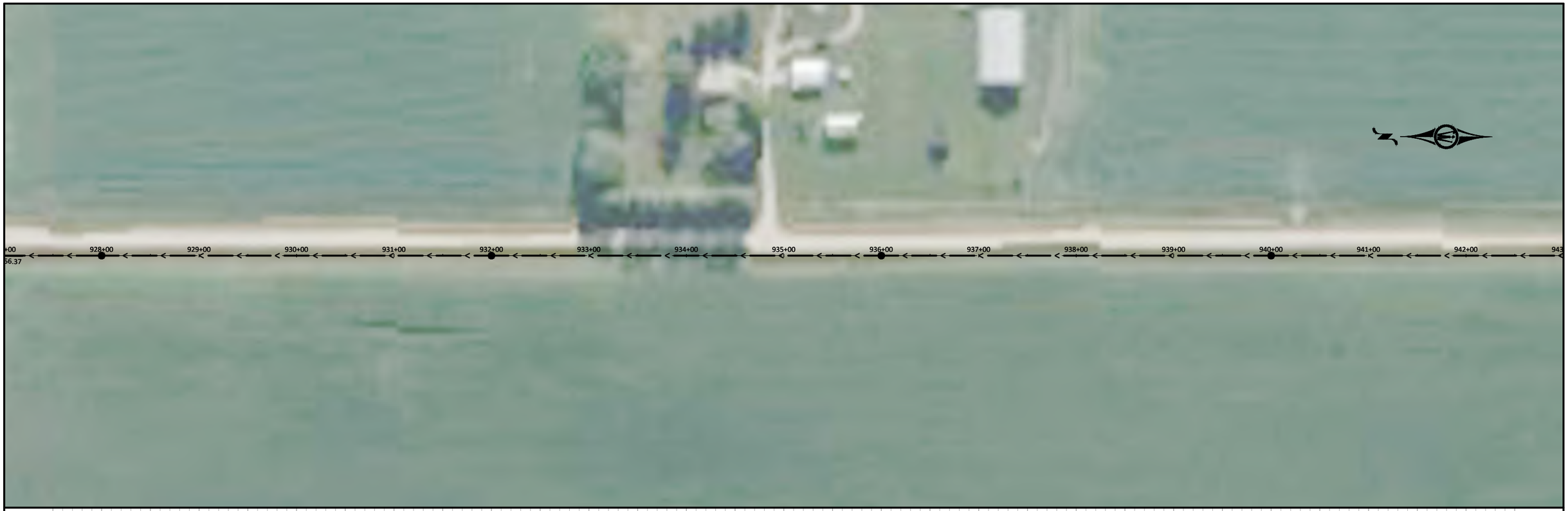
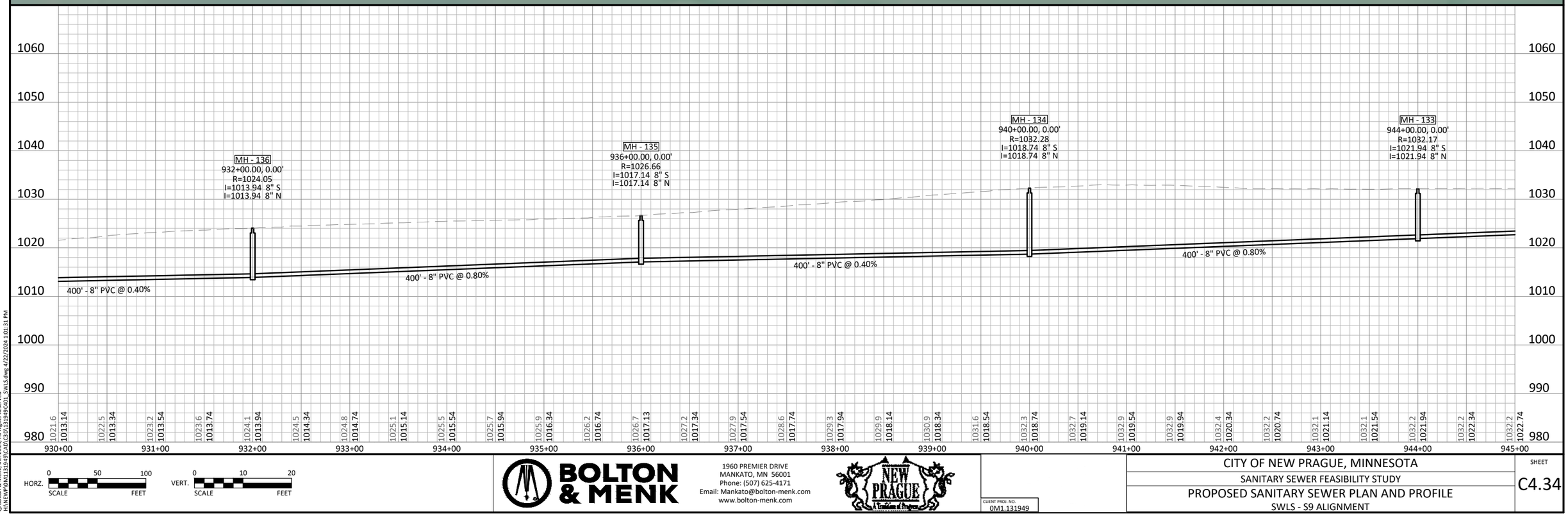
SWLS - S9 ALIGNMENT

SHEET
C4.33





HORZ. 0 50 100 SCALE FEET

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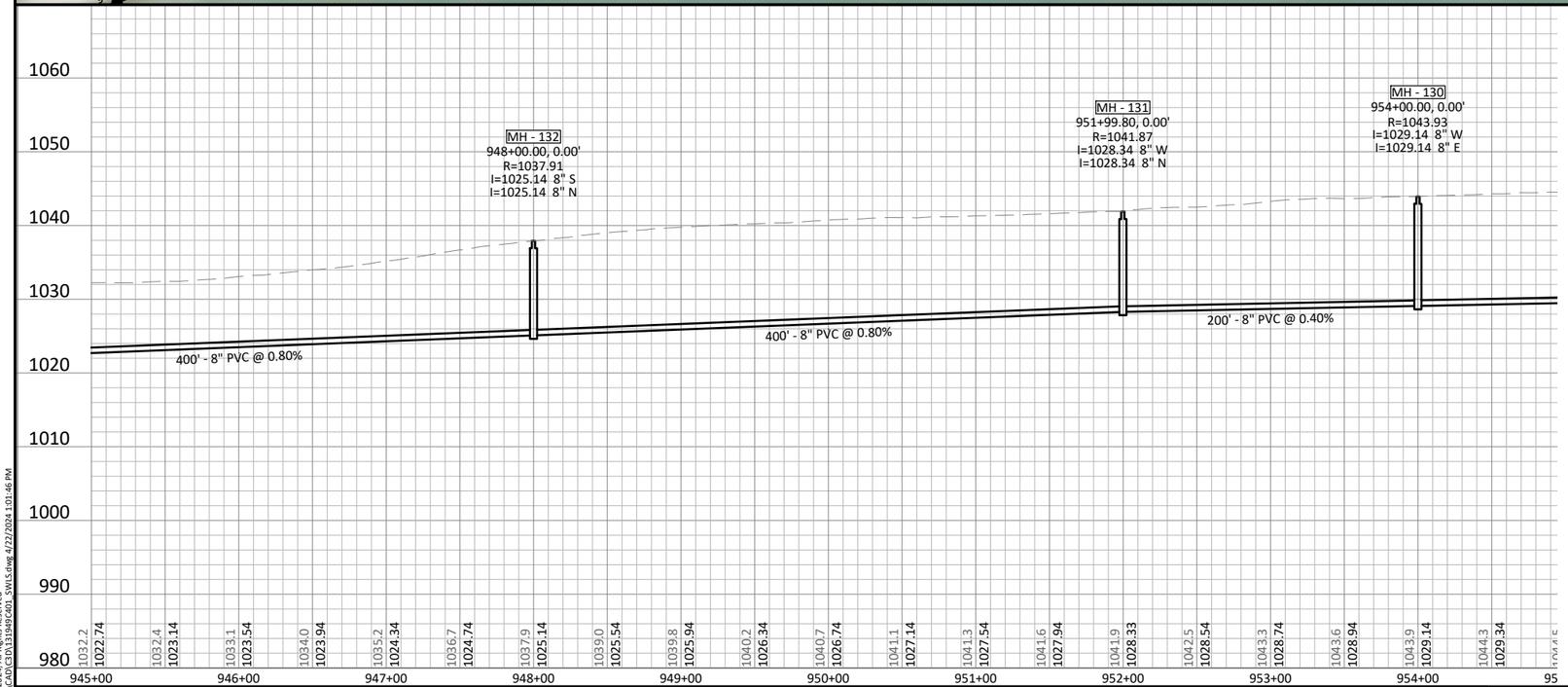
SWLS - S9 ALIGNMENT

SHEET C4.34



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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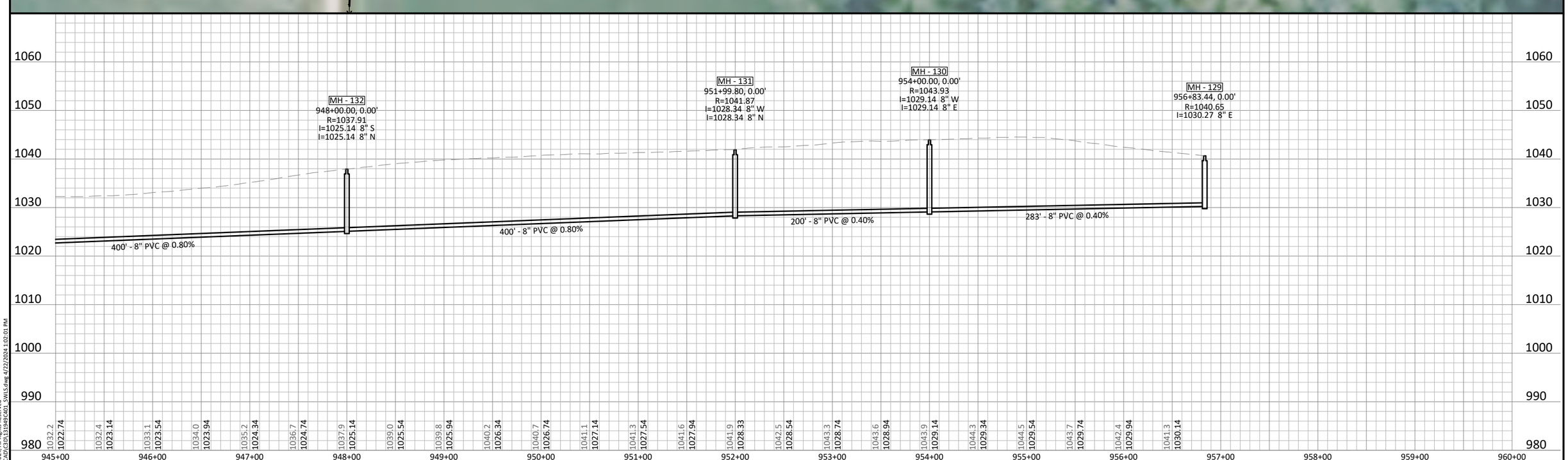
SWLS - S9 ALIGNMENT

SHEET C4.35



HORZ. 0 50 100 SCALE FEET
VERT. 0 10 20 SCALE FEET

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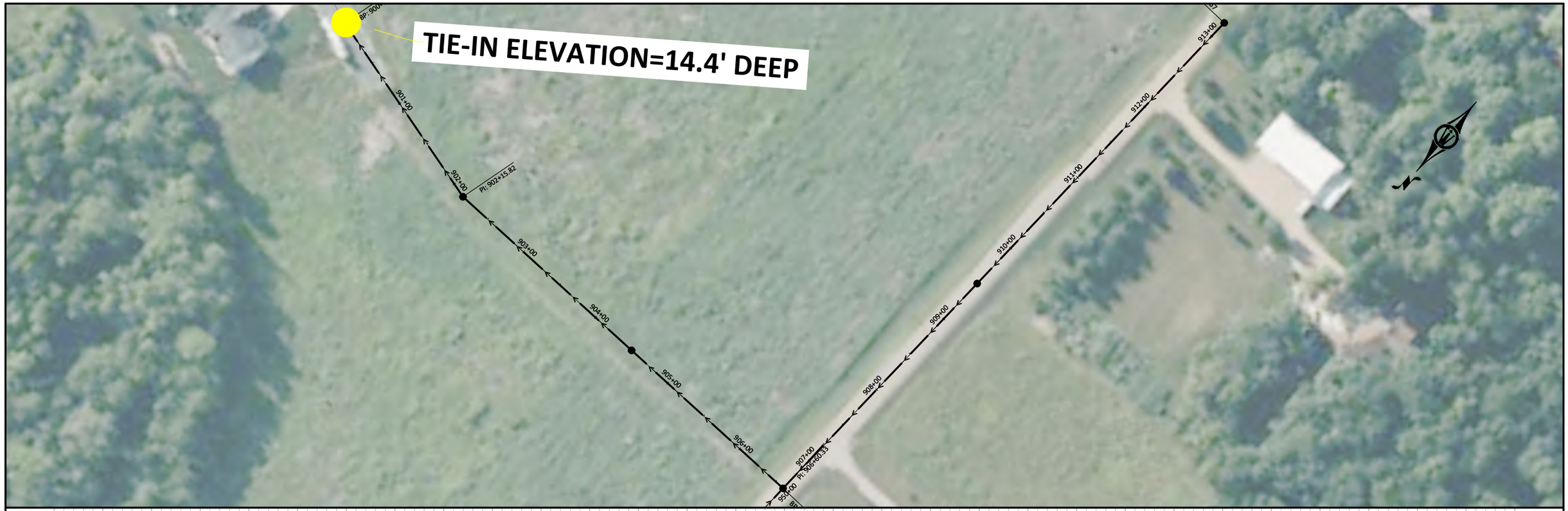
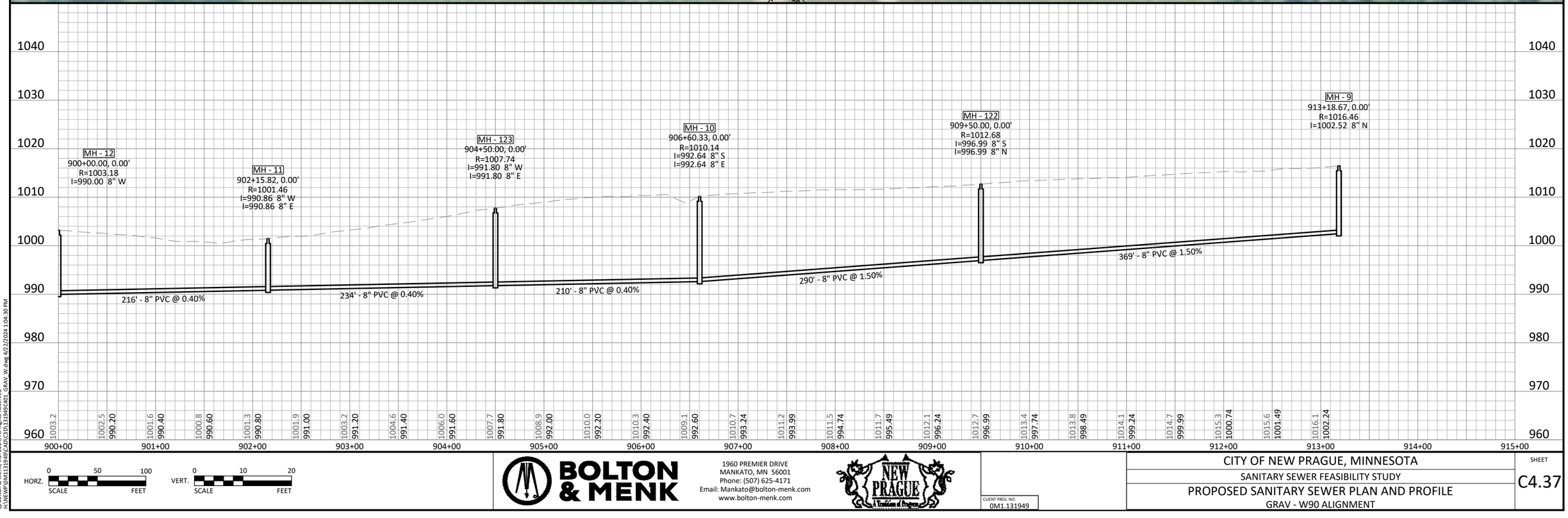
SWLS - S9 ALIGNMENT

SHEET
C4.36





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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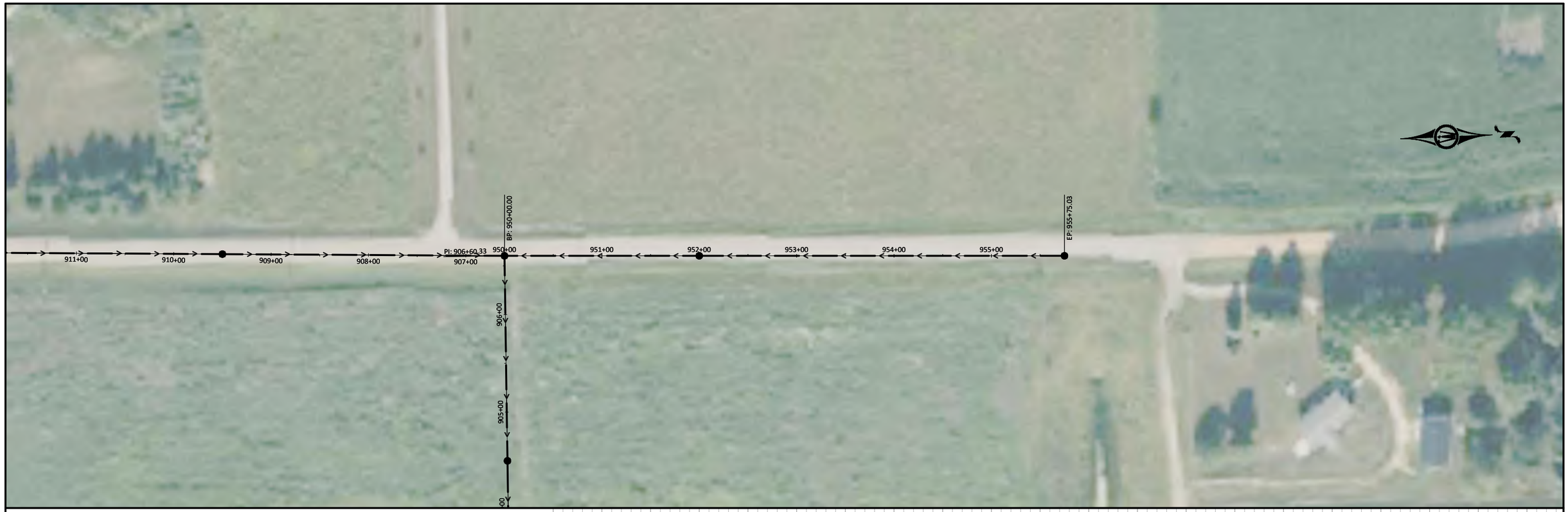
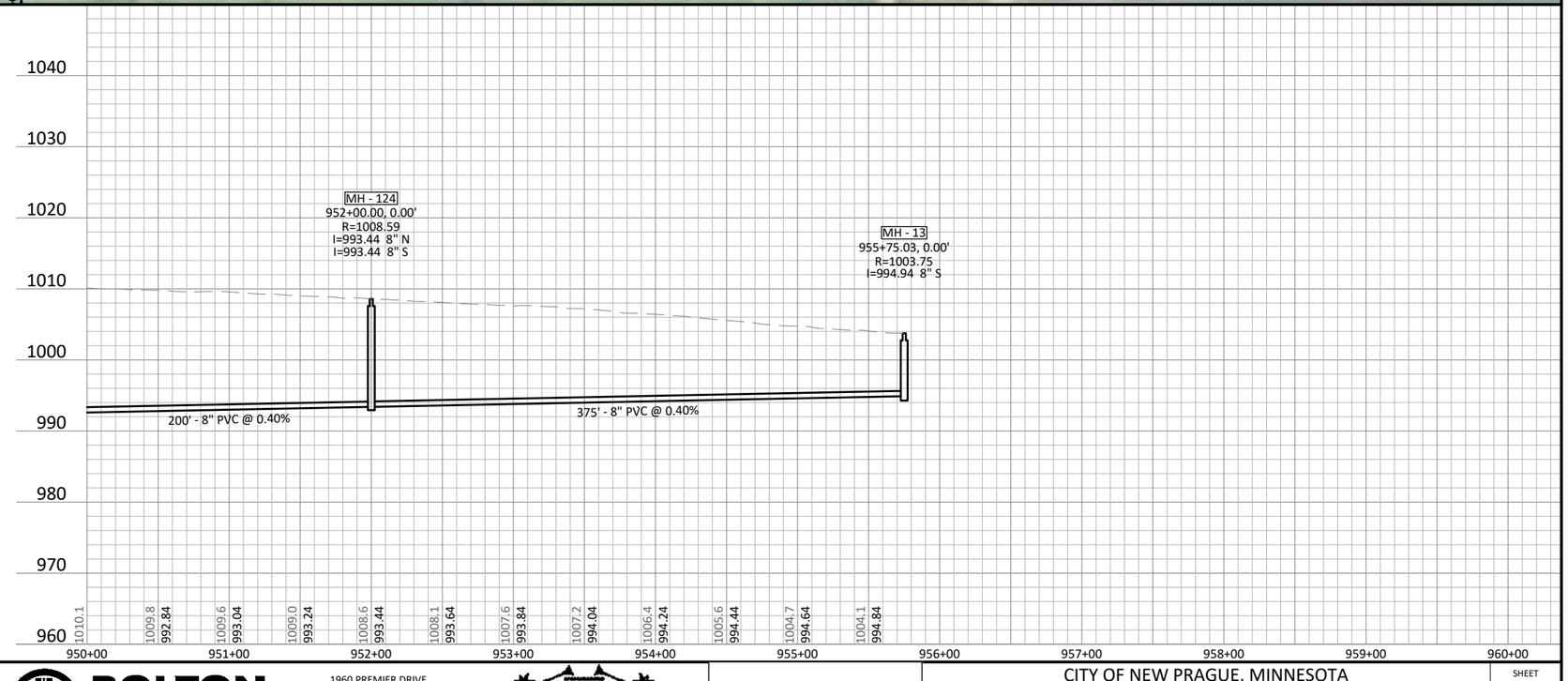
GRAV - W90 ALIGNMENT

SHEET C4.37





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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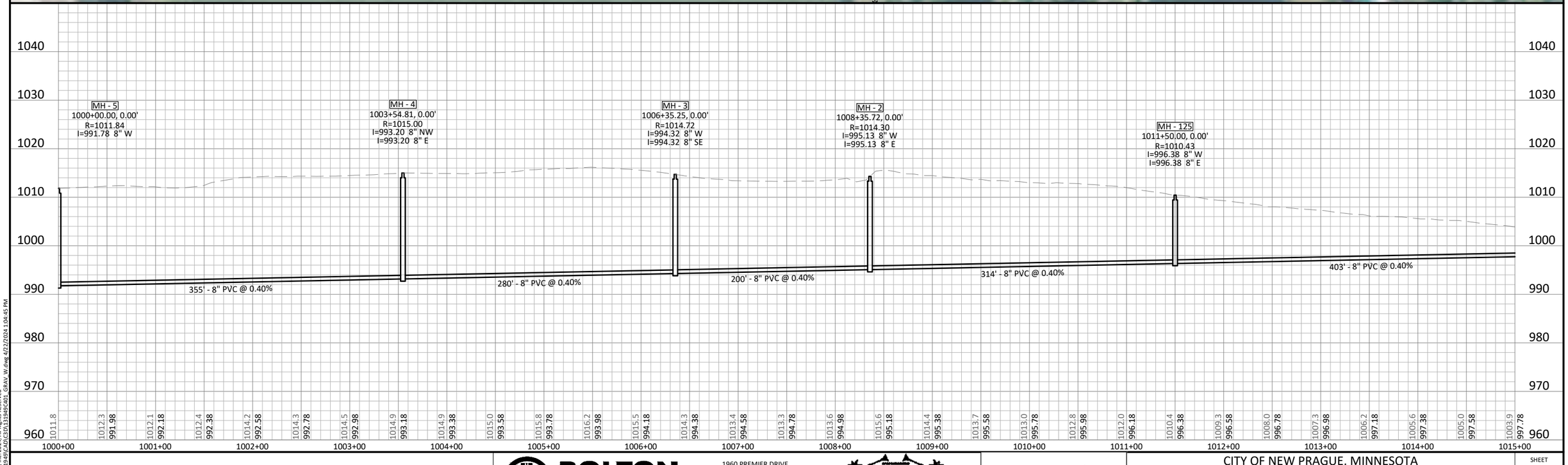
GRAV - W95 ALIGNMENT

SHEET
C4.38



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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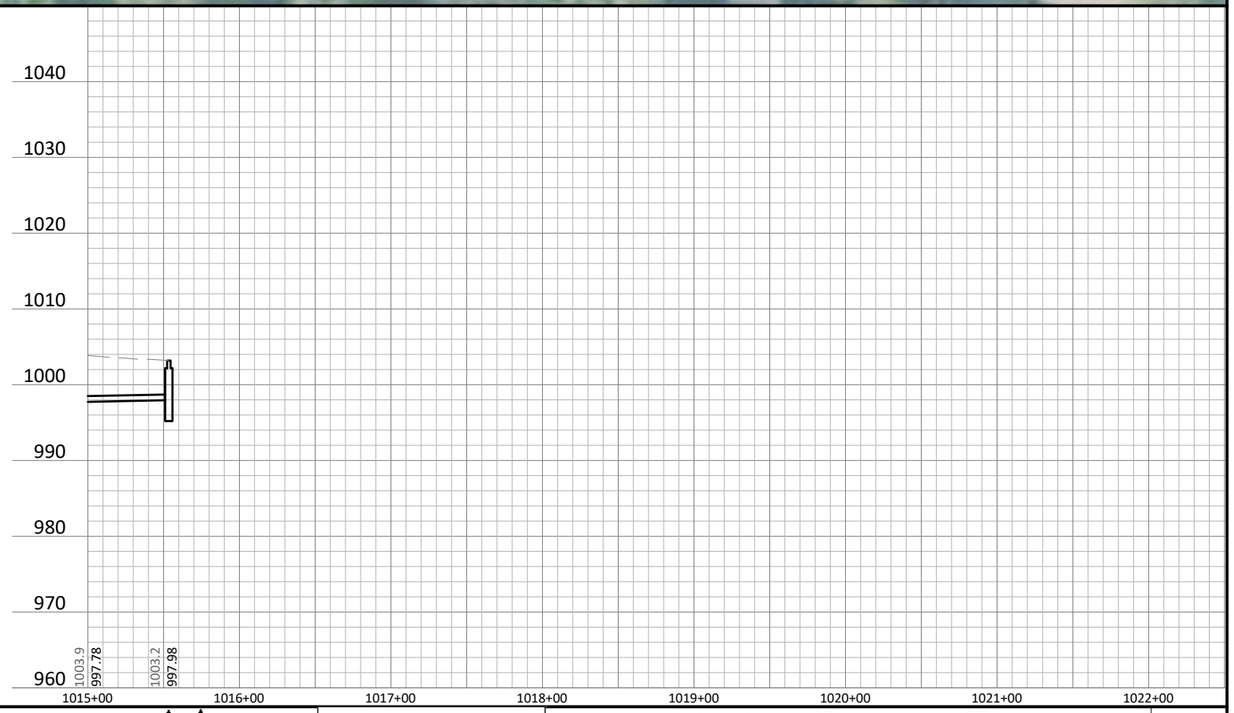
GRAV - W100 ALIGNMENT

SHEET C4.39



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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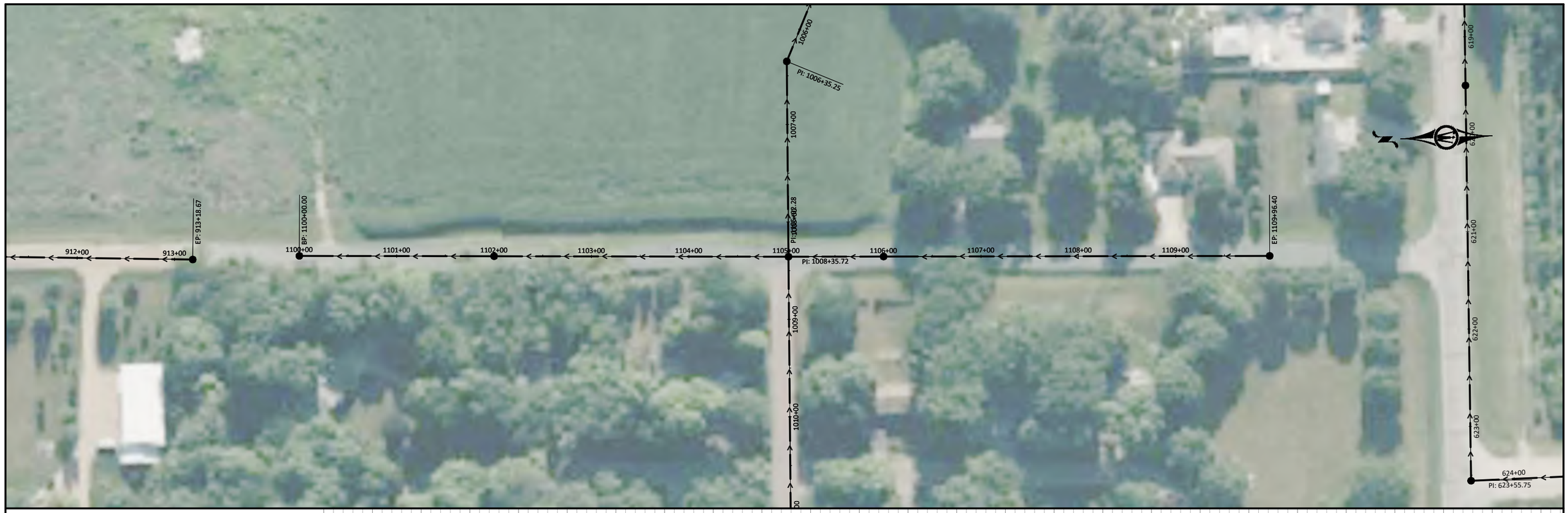
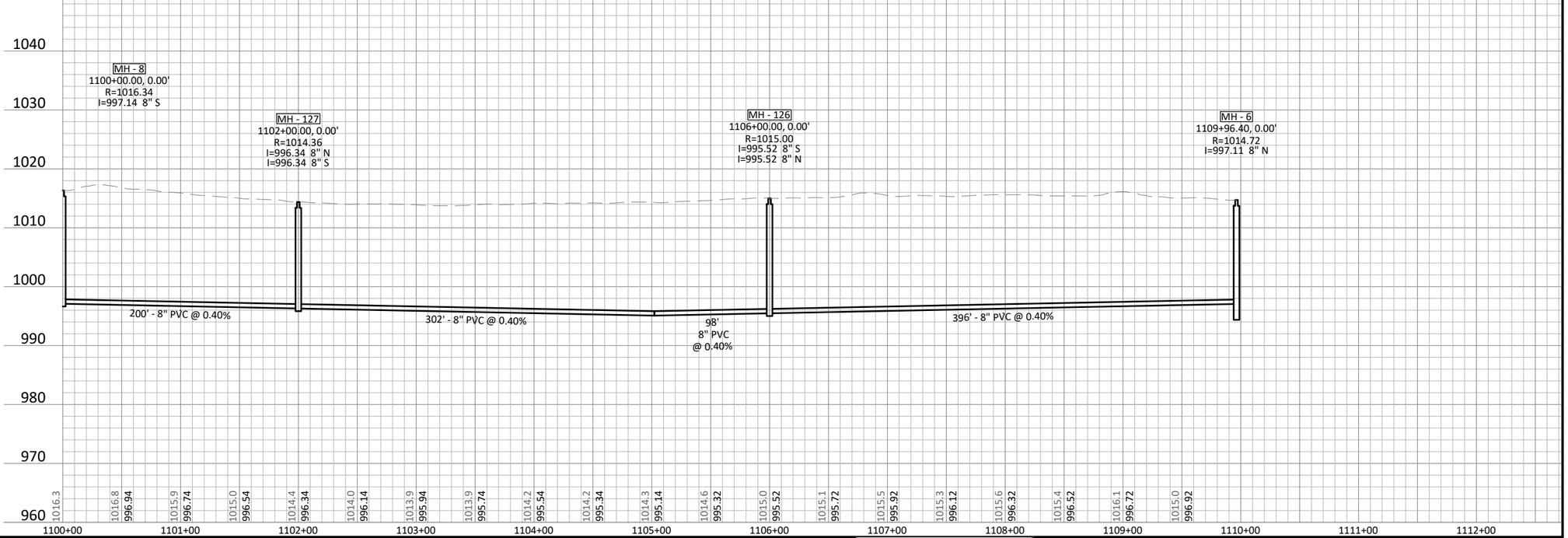
GRAV - W100 ALIGNMENT

SHEET C4.40





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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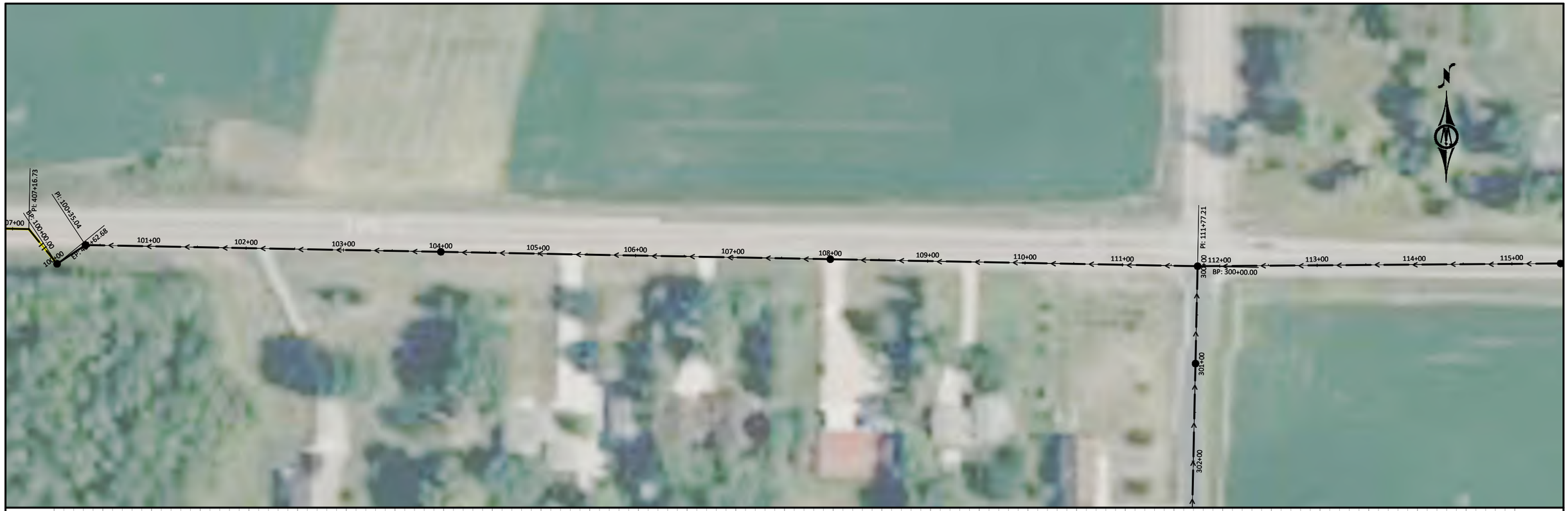
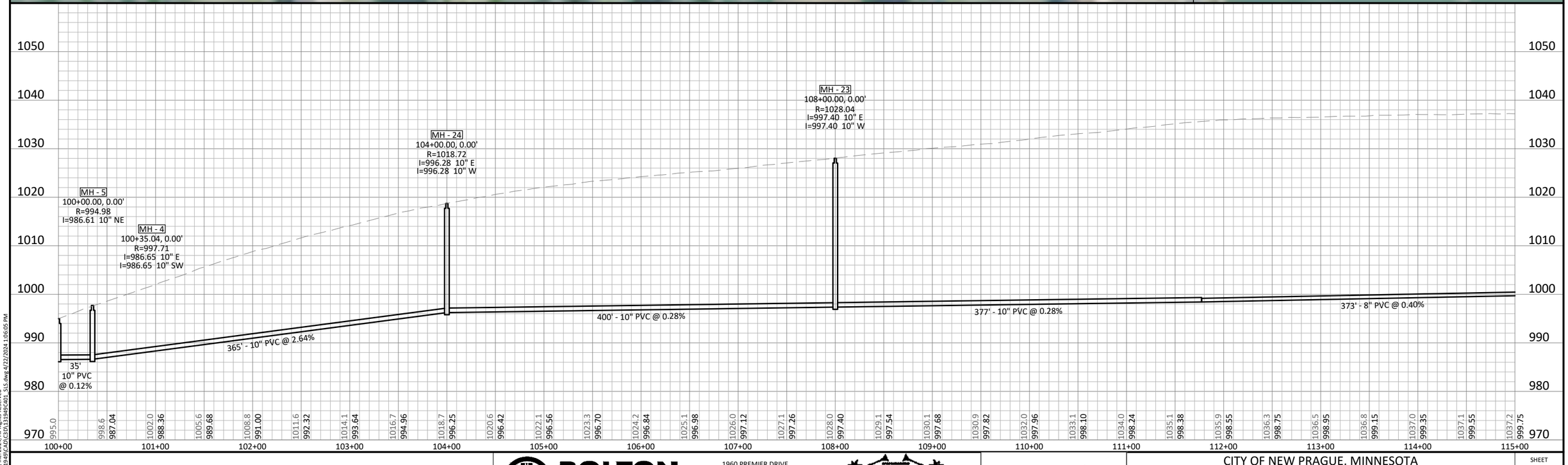
GRAV - W110 ALIGNMENT

SHEET
C4.41





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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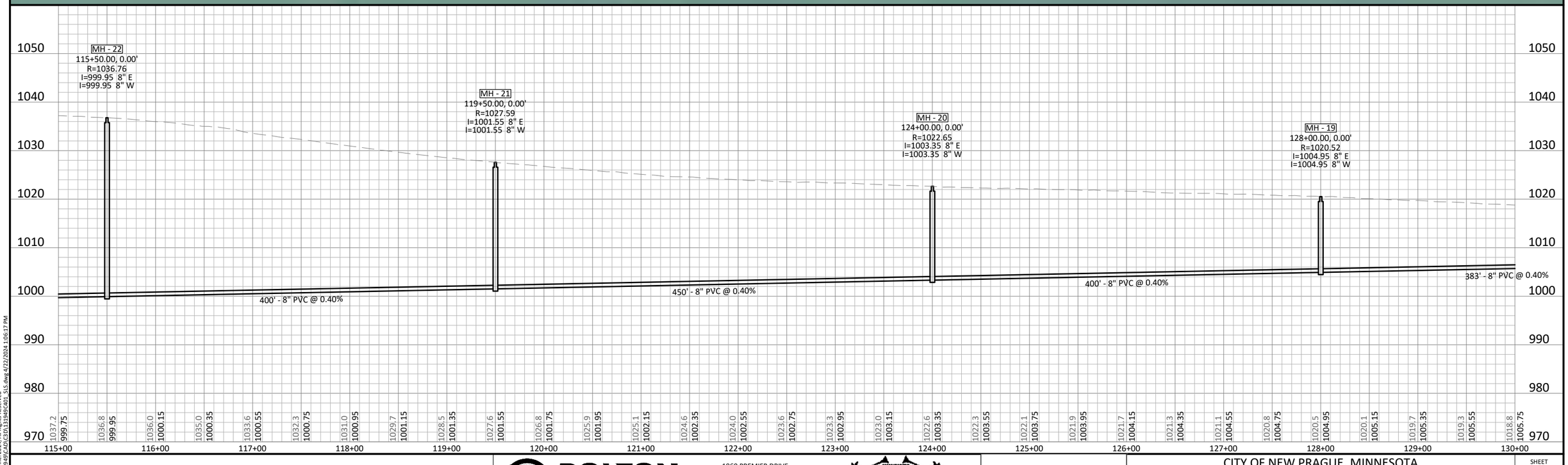
SLS - E1 ALIGNMENT

SHEET C4.42



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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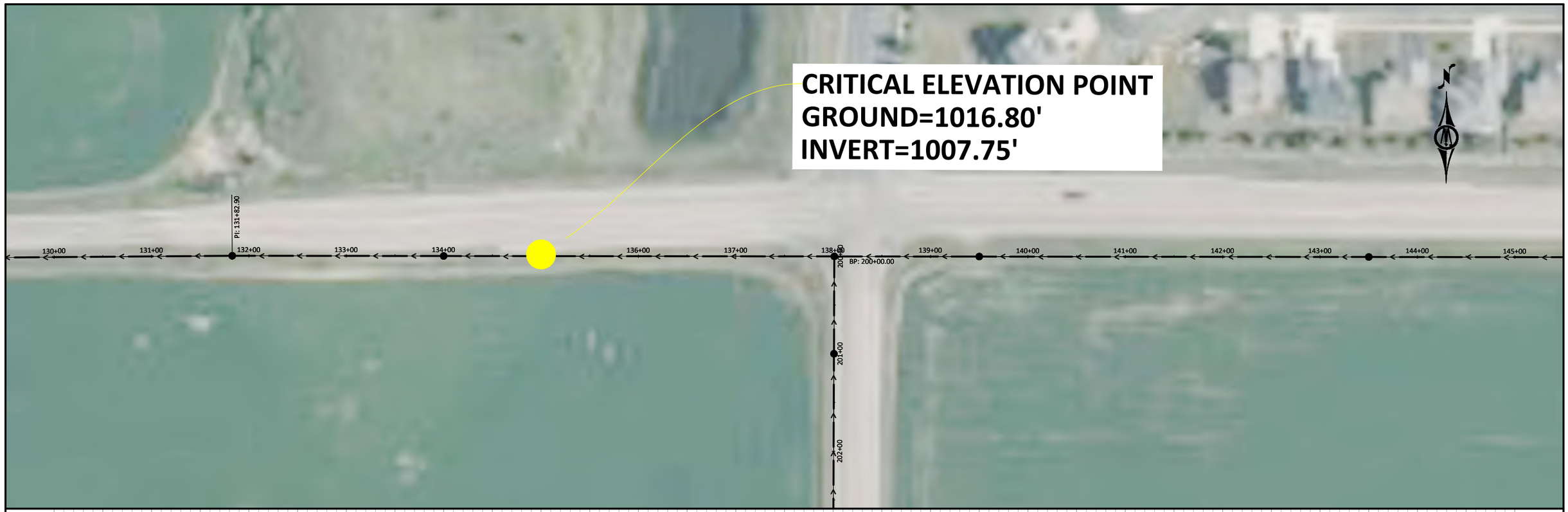
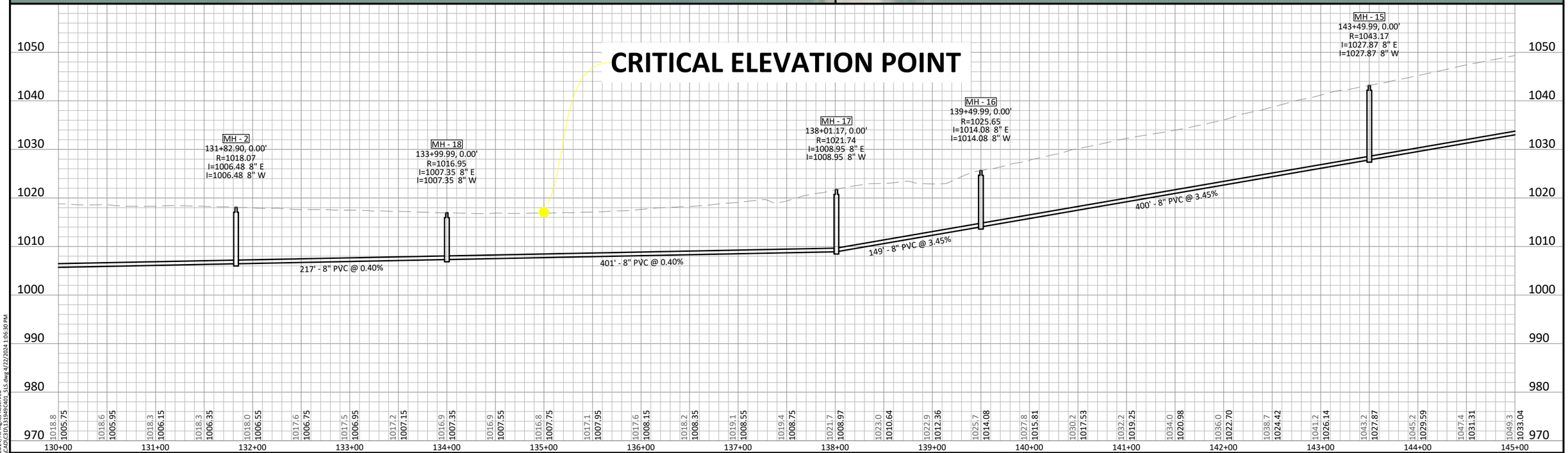
SLS - E1 ALIGNMENT

SHEET C4.43





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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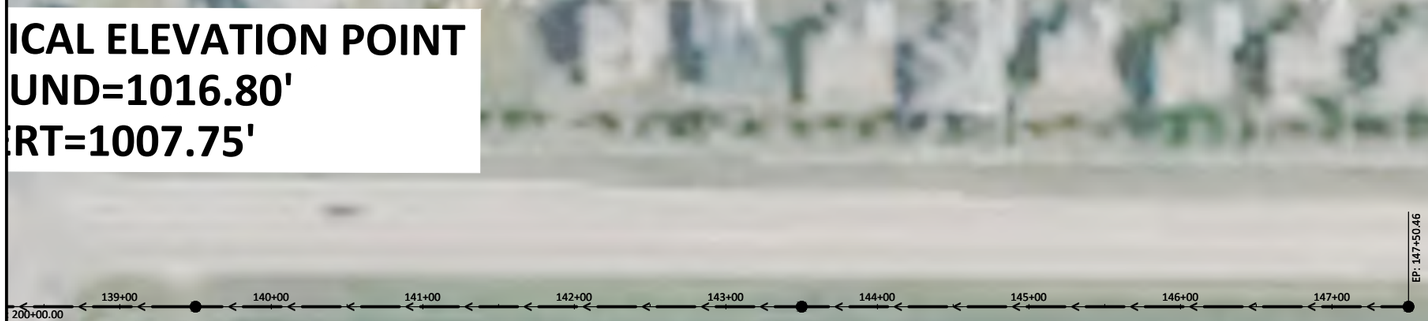
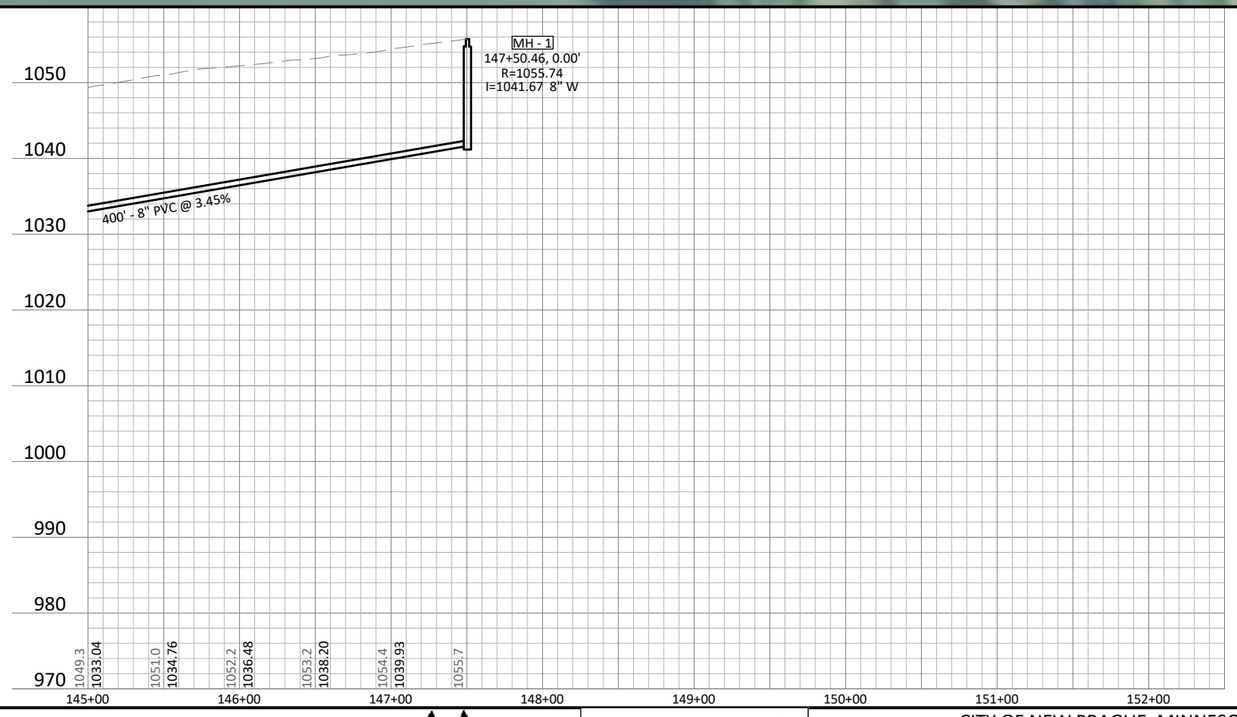
SLS - E1 ALIGNMENT

SHEET C4.44

H:\NEWP\0M1131949\CAD\C3D\131949C401_SLS.dwg 4/22/2024 1:06:30 PM

ICAL ELEVATION POINT
UND=1016.80'
RT=1007.75'





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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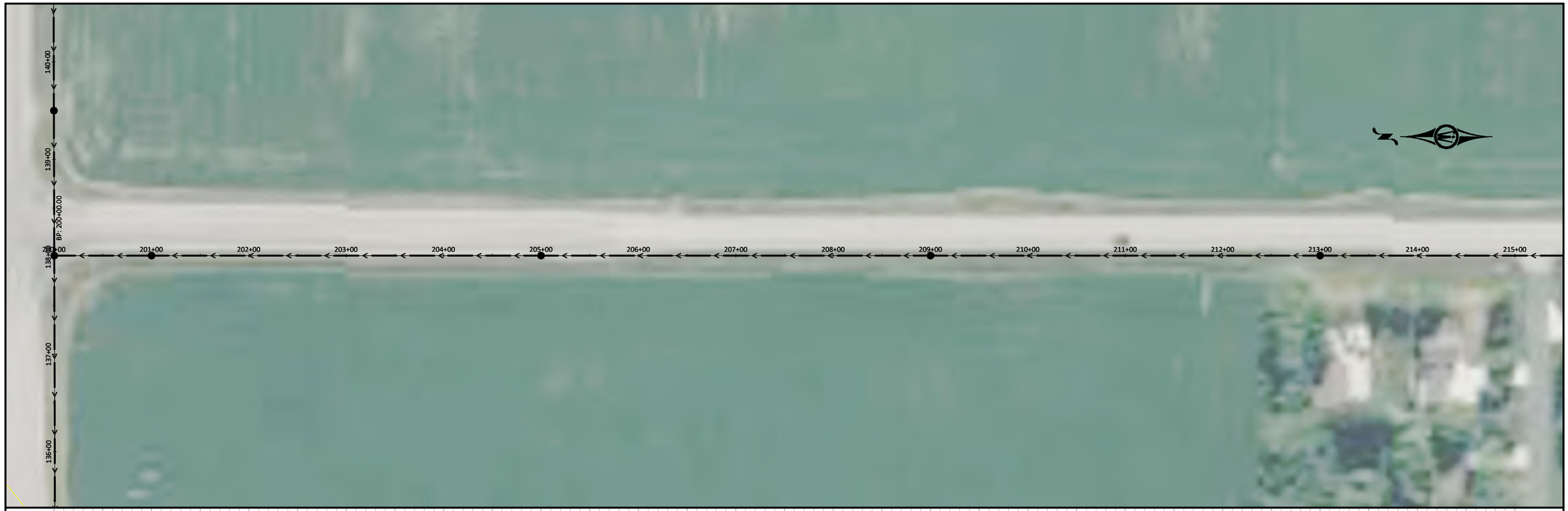
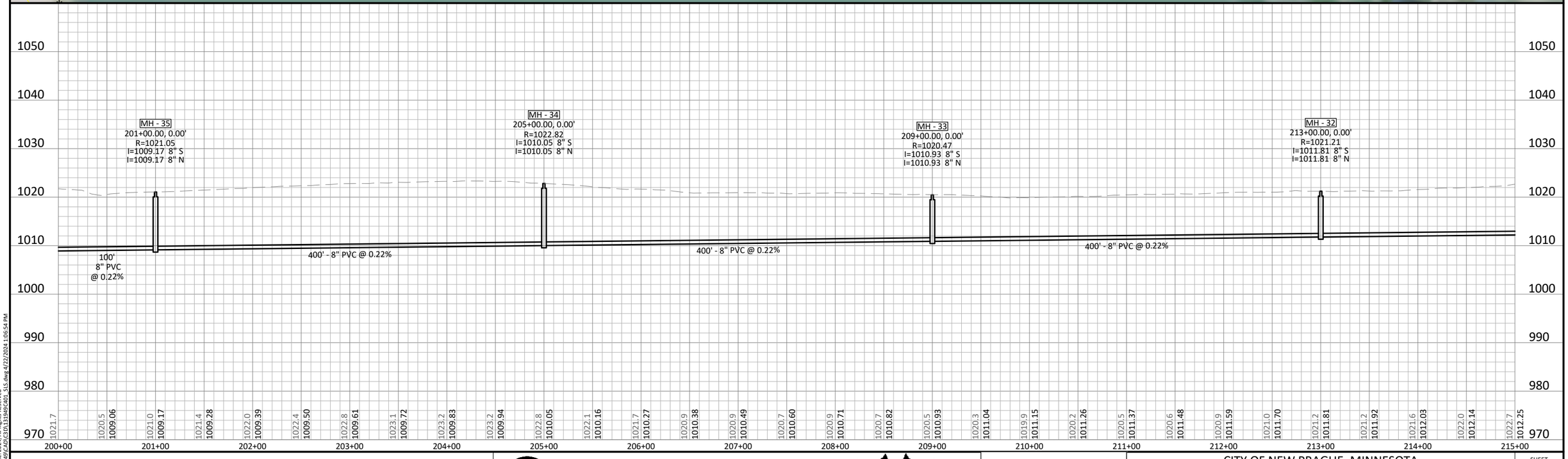
SLS - E1 ALIGNMENT

SHEET
C4.45





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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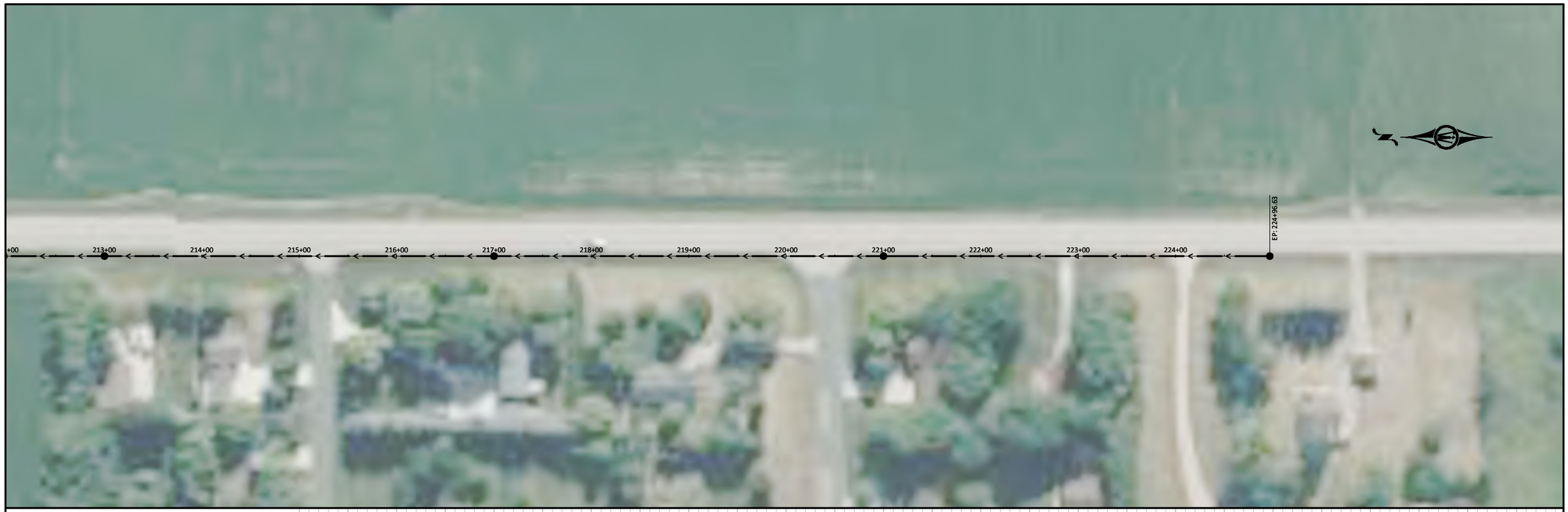
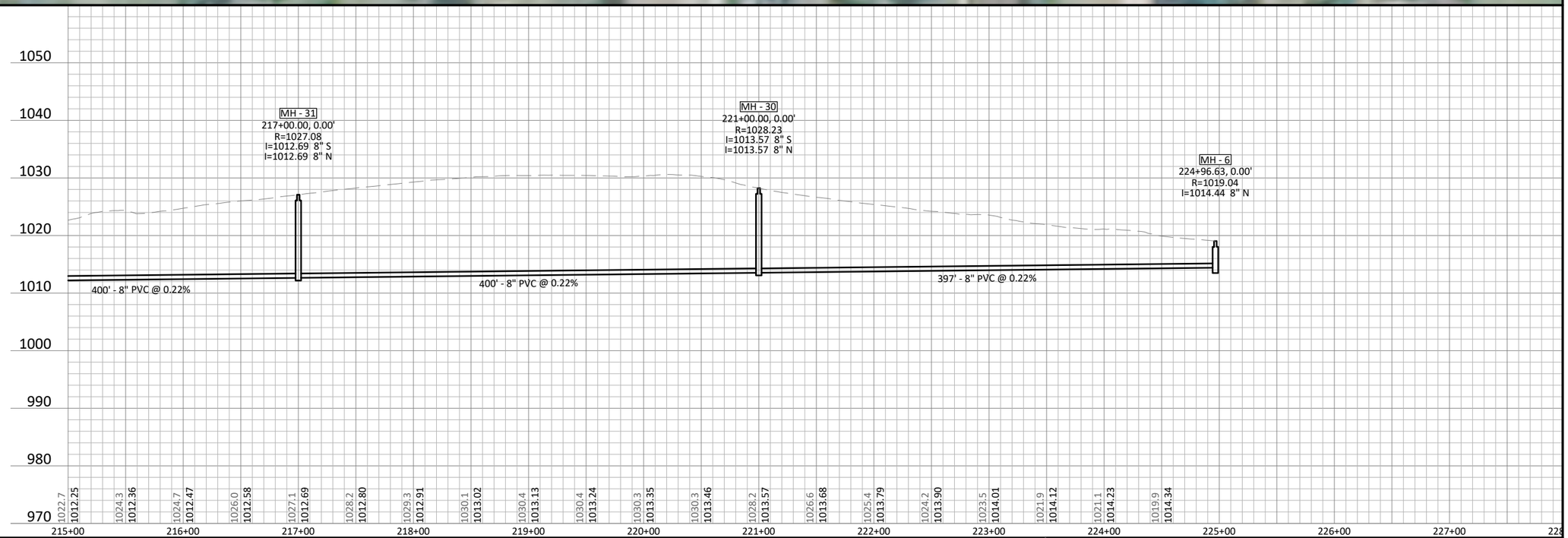
SLS - E2 ALIGNMENT

SHEET C4.46





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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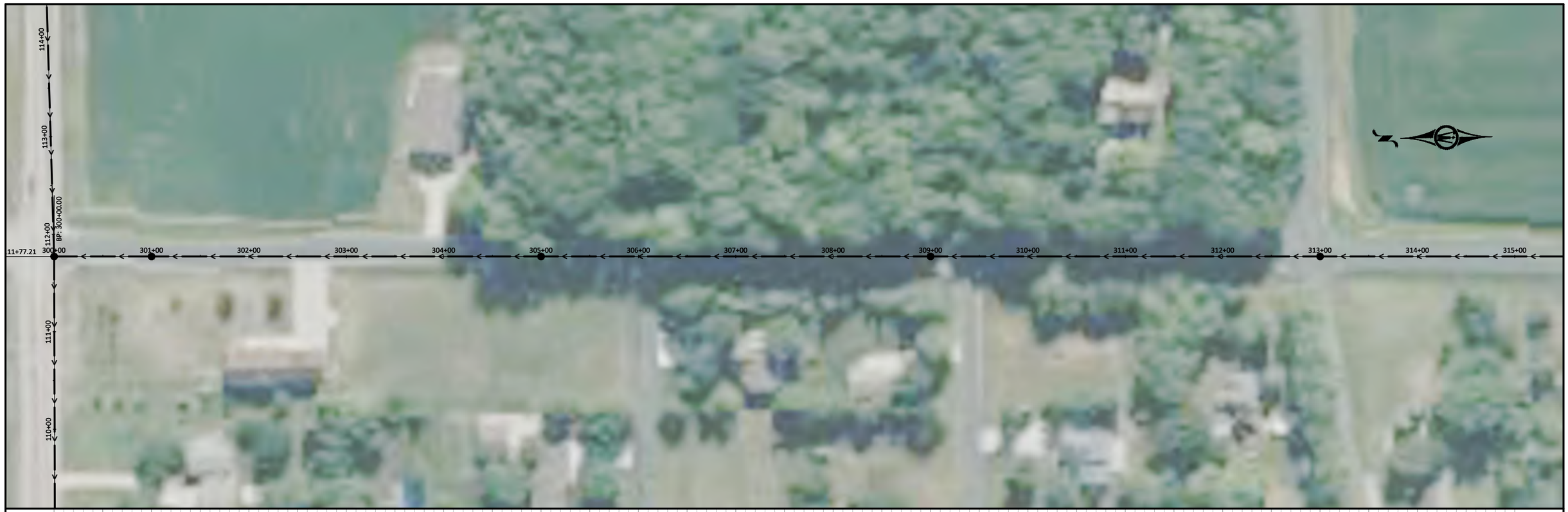
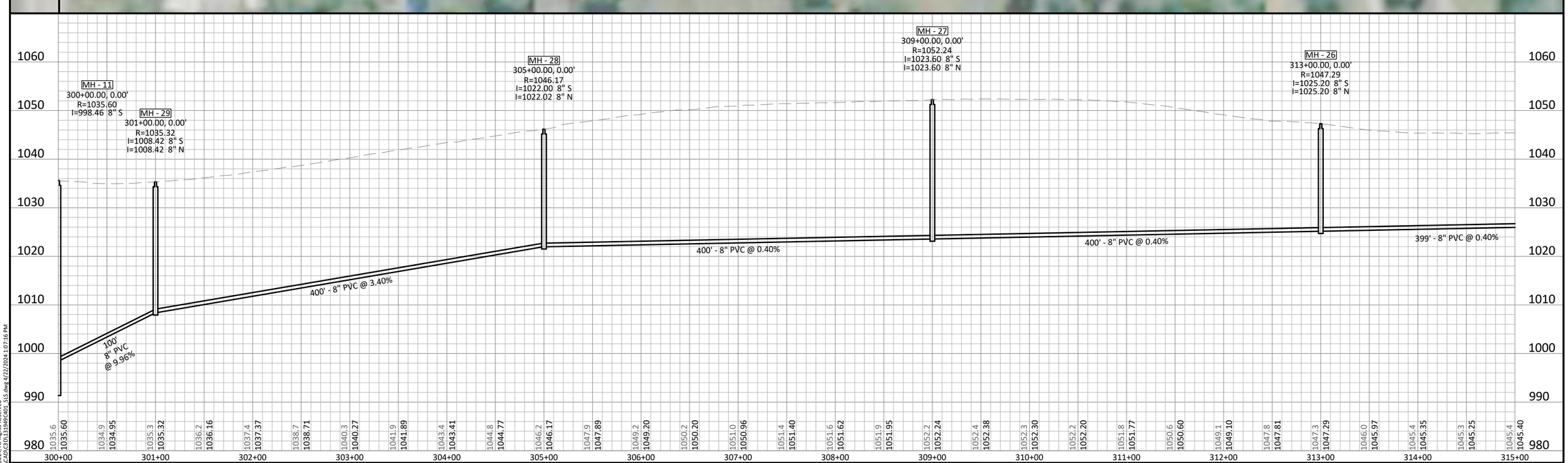
SHEET C4.47





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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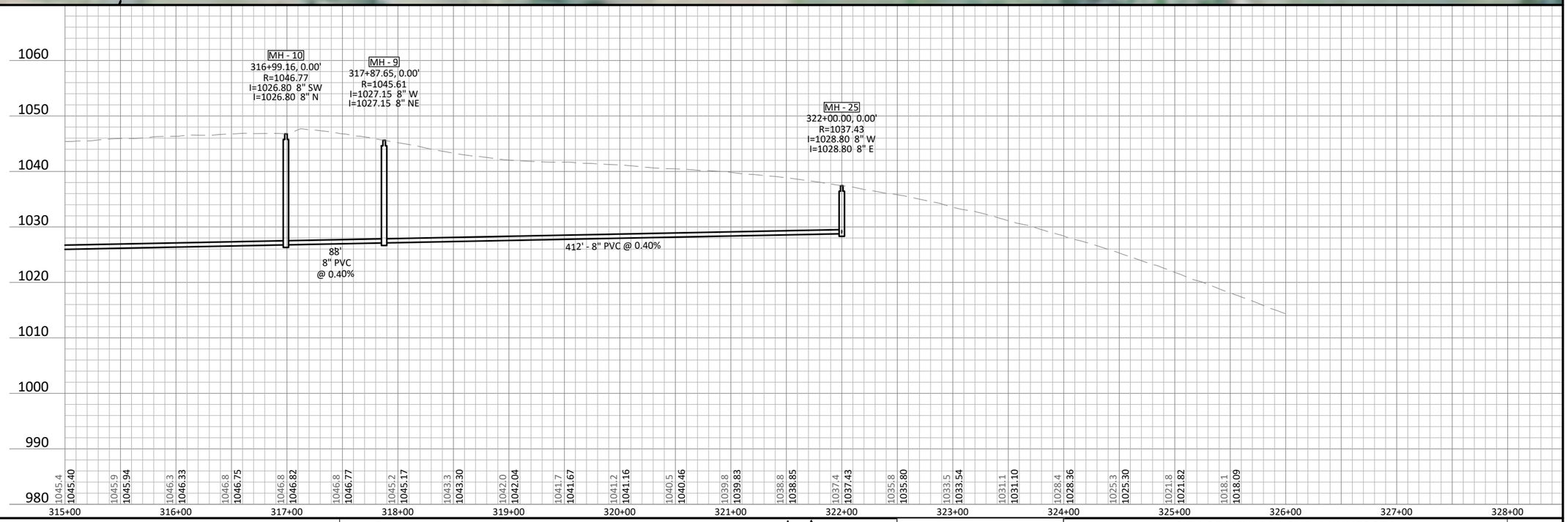
SLS - E3 ALIGNMENT

SHEET C4.48



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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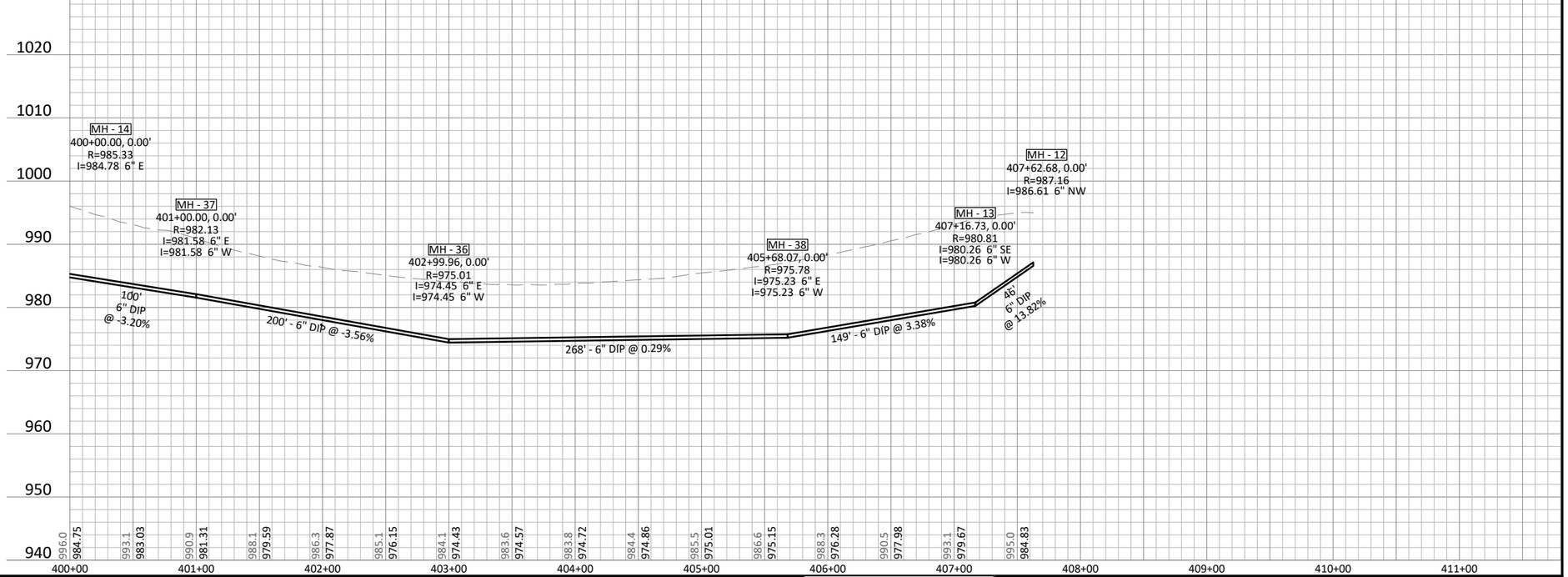
SHEET
C4.49



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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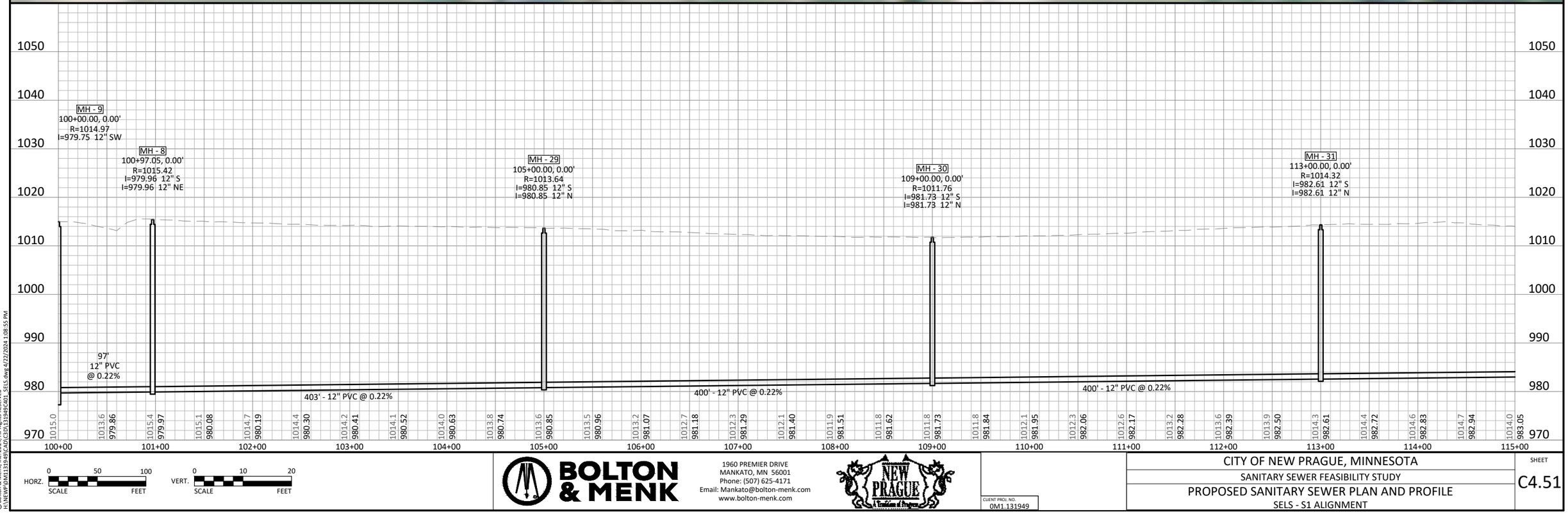
SHEET C4.50



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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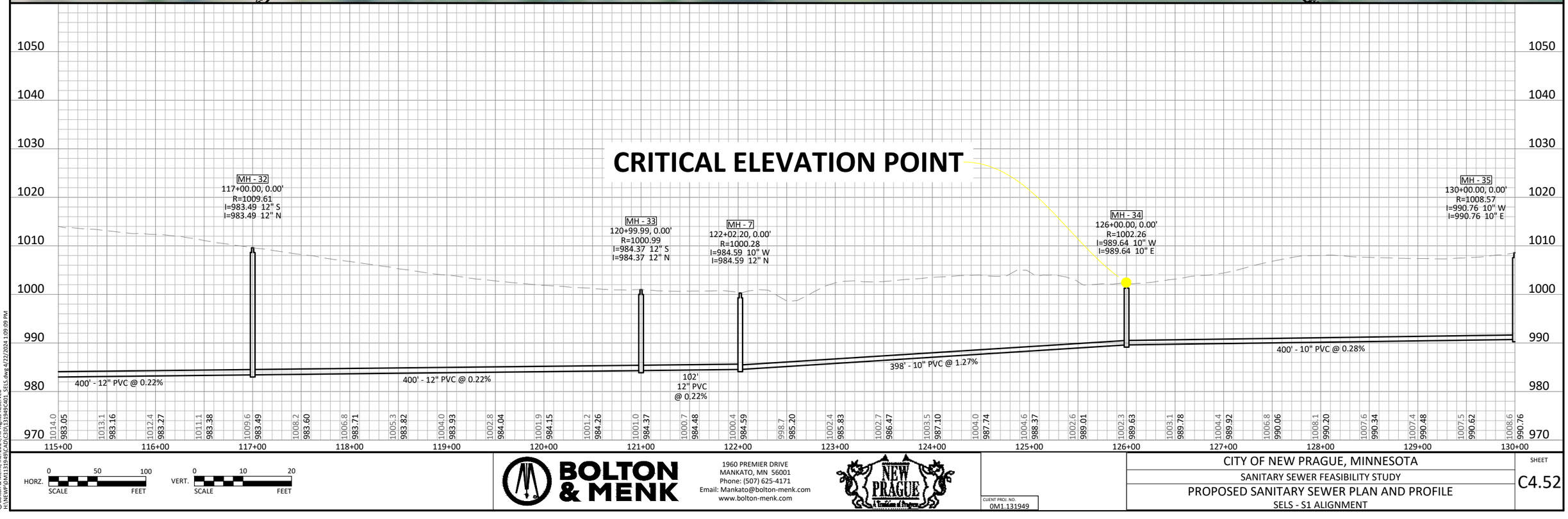
SELS - S1 ALIGNMENT

SHEET C4.51



HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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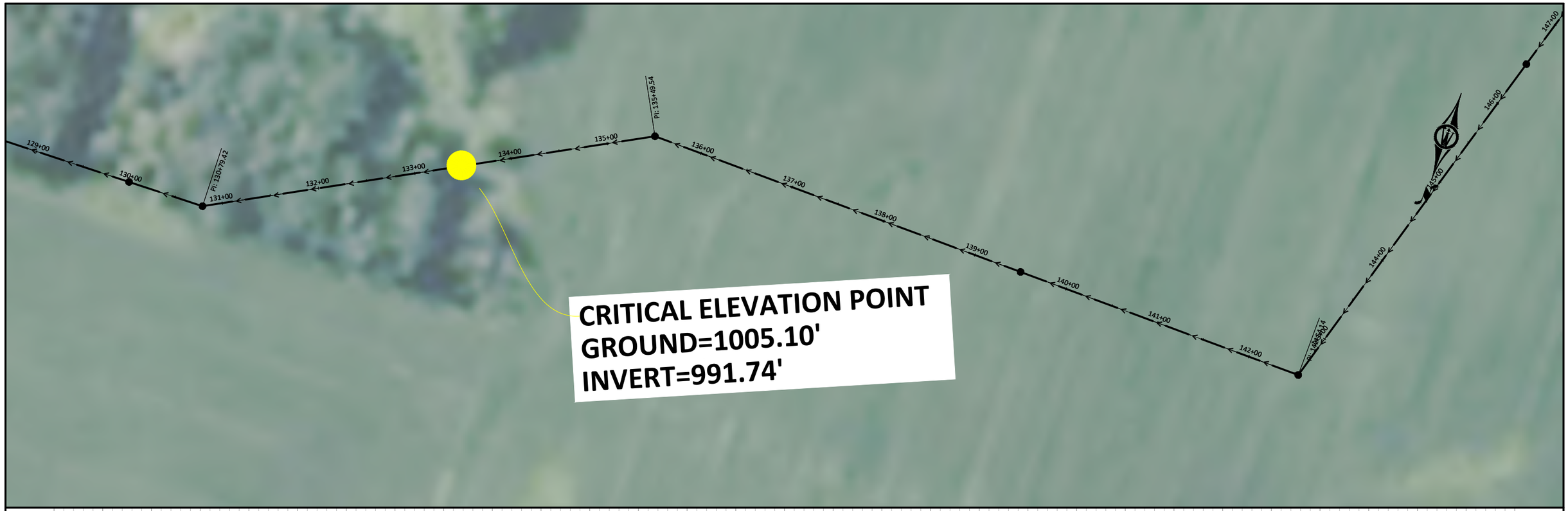
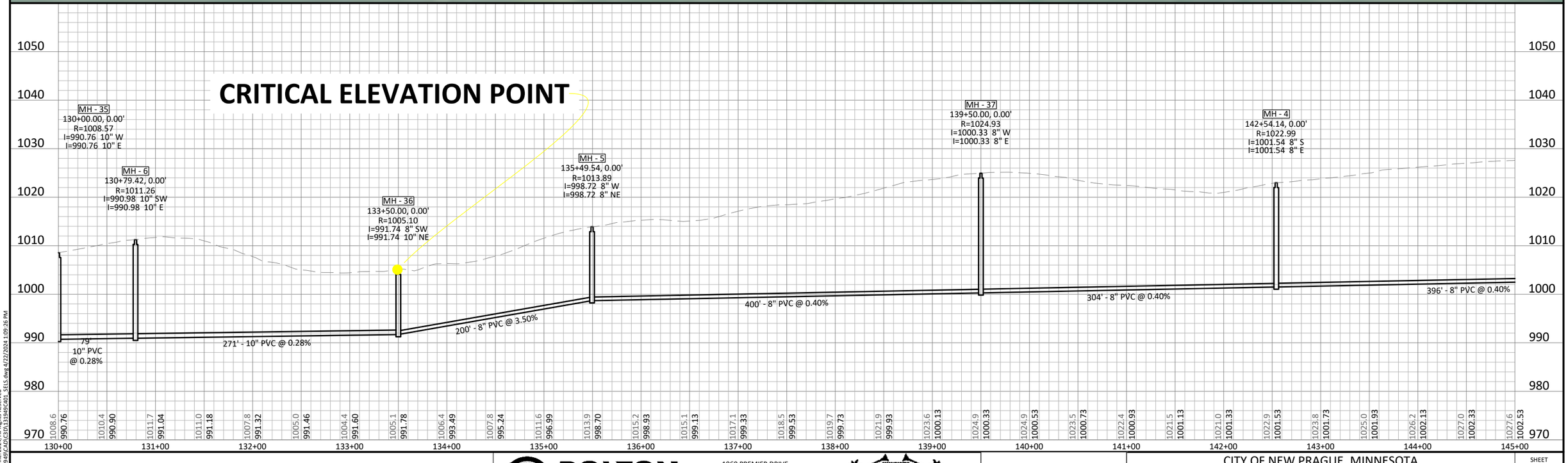
SELS - S1 ALIGNMENT

SHEET C4.52





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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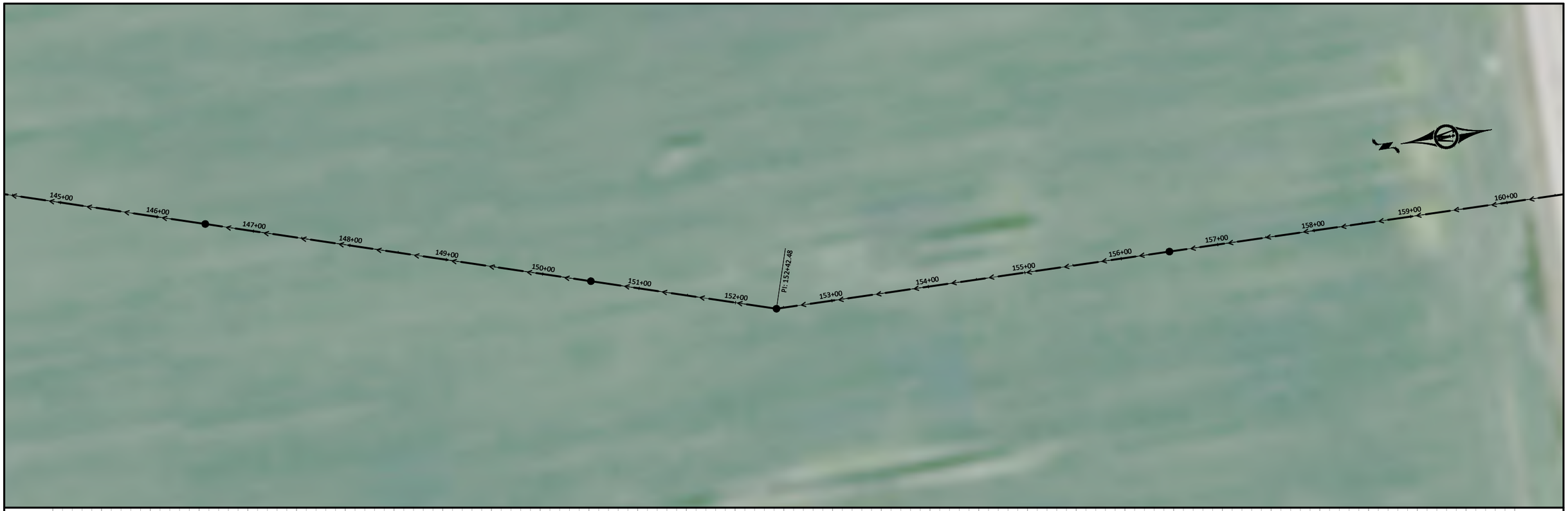
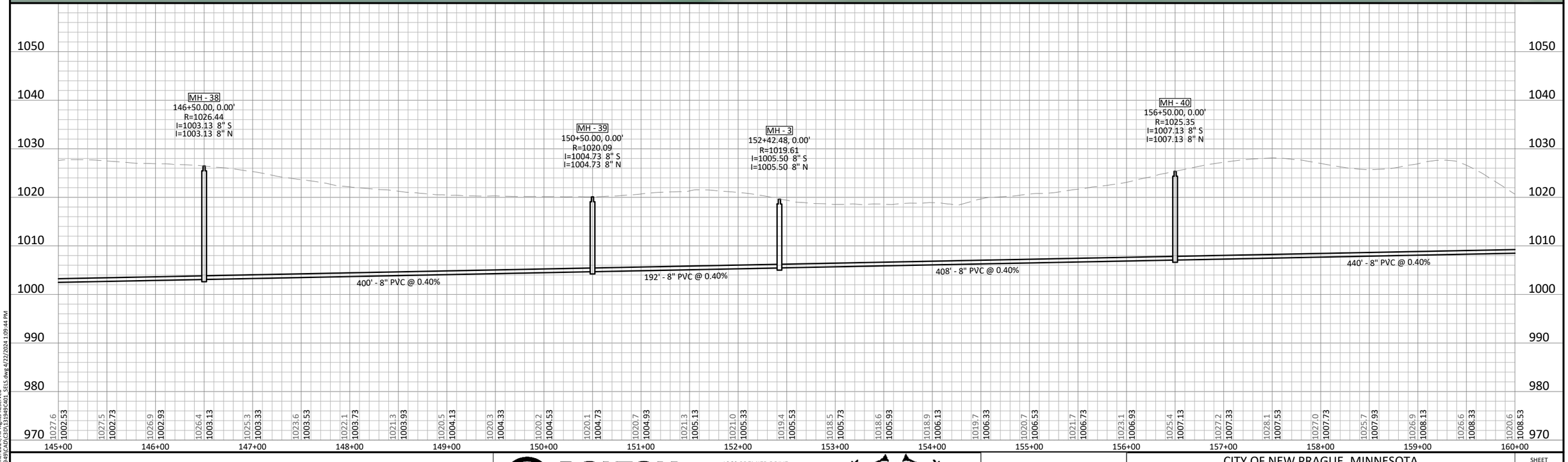
SELS - S1 ALIGNMENT

SHEET C4.53





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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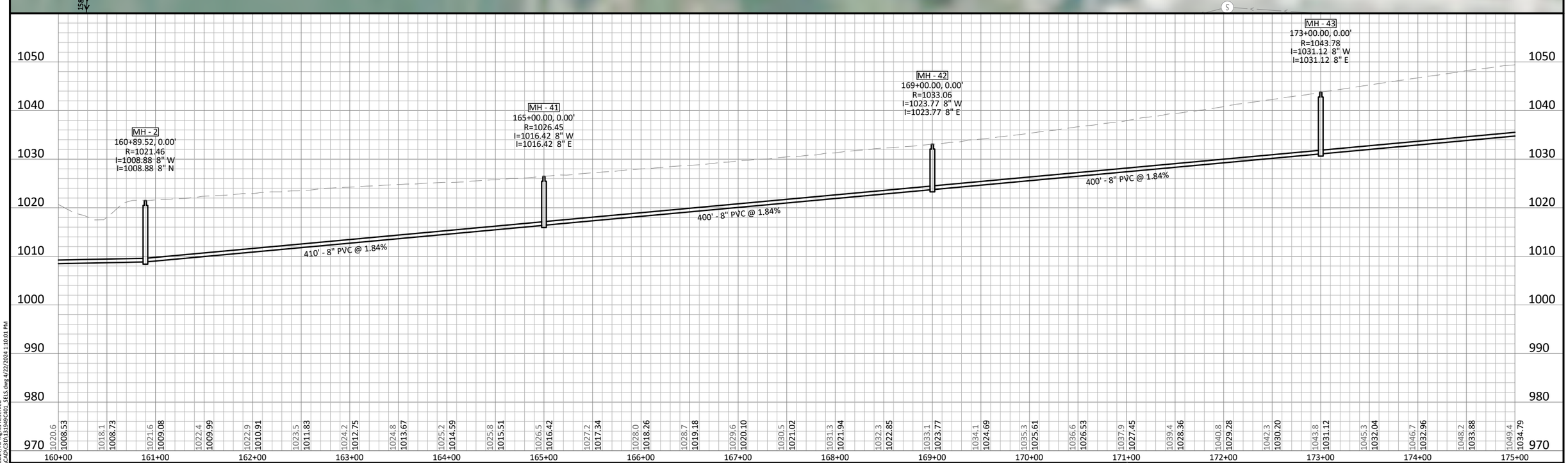
SELS - S1 ALIGNMENT

SHEET
C4.54



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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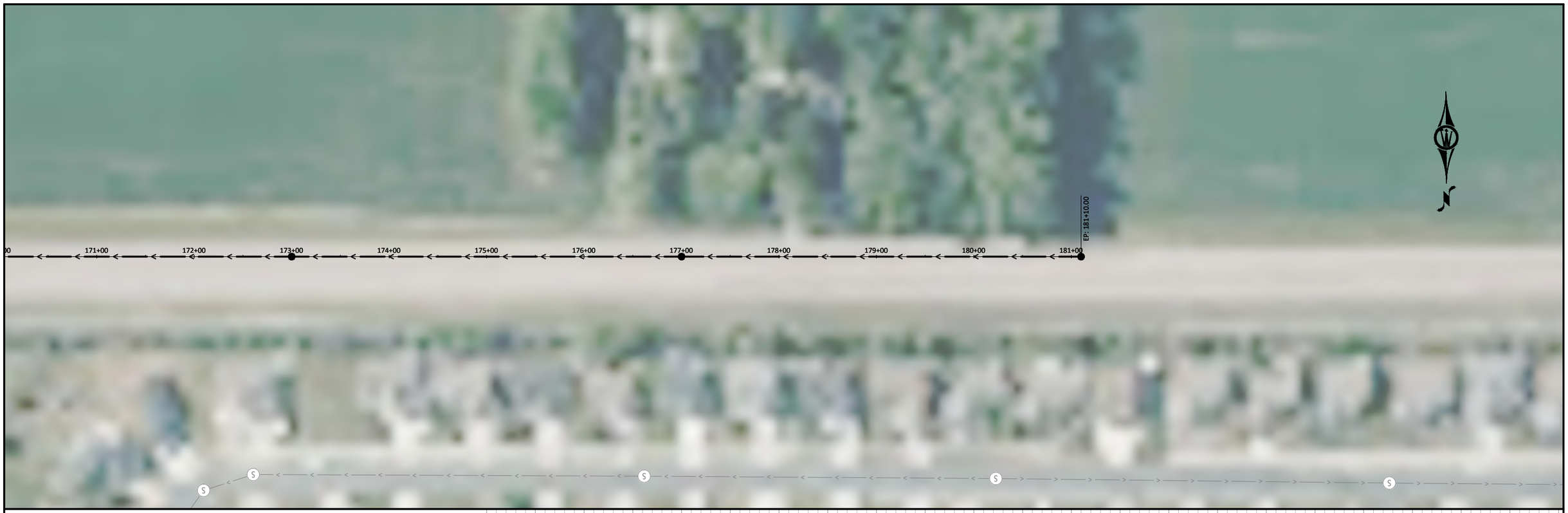
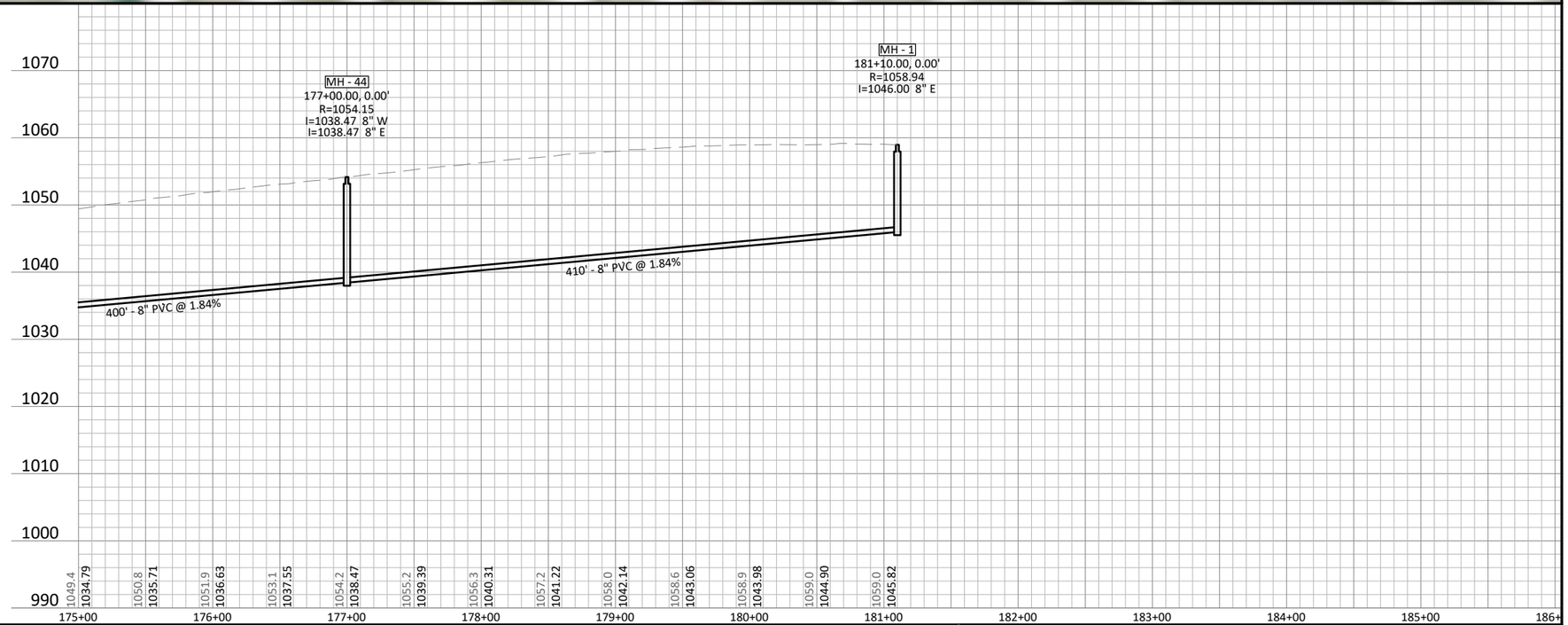
SHEET
C4.55





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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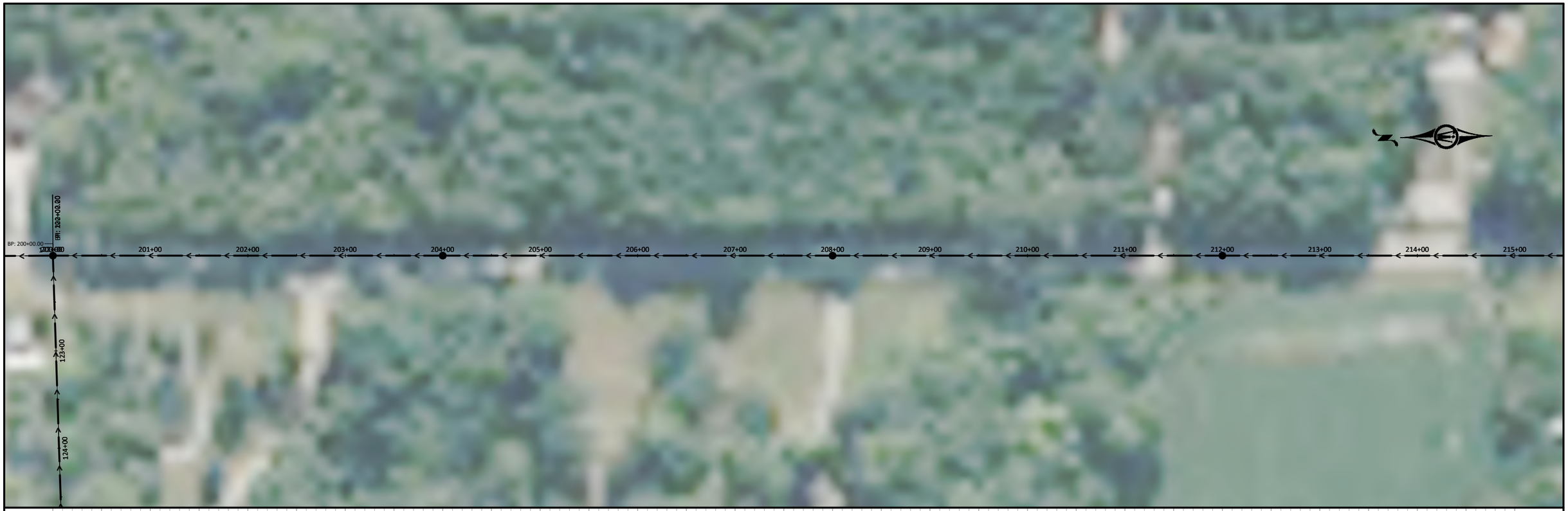
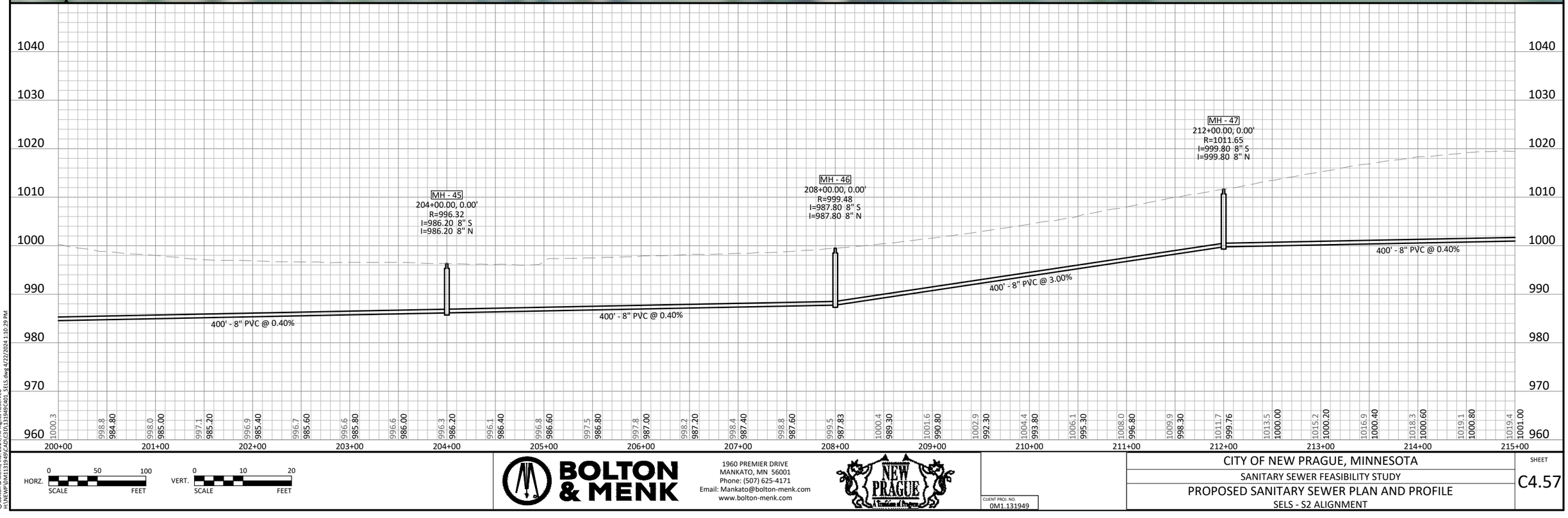
SELS - S1 ALIGNMENT

SHEET C4.56





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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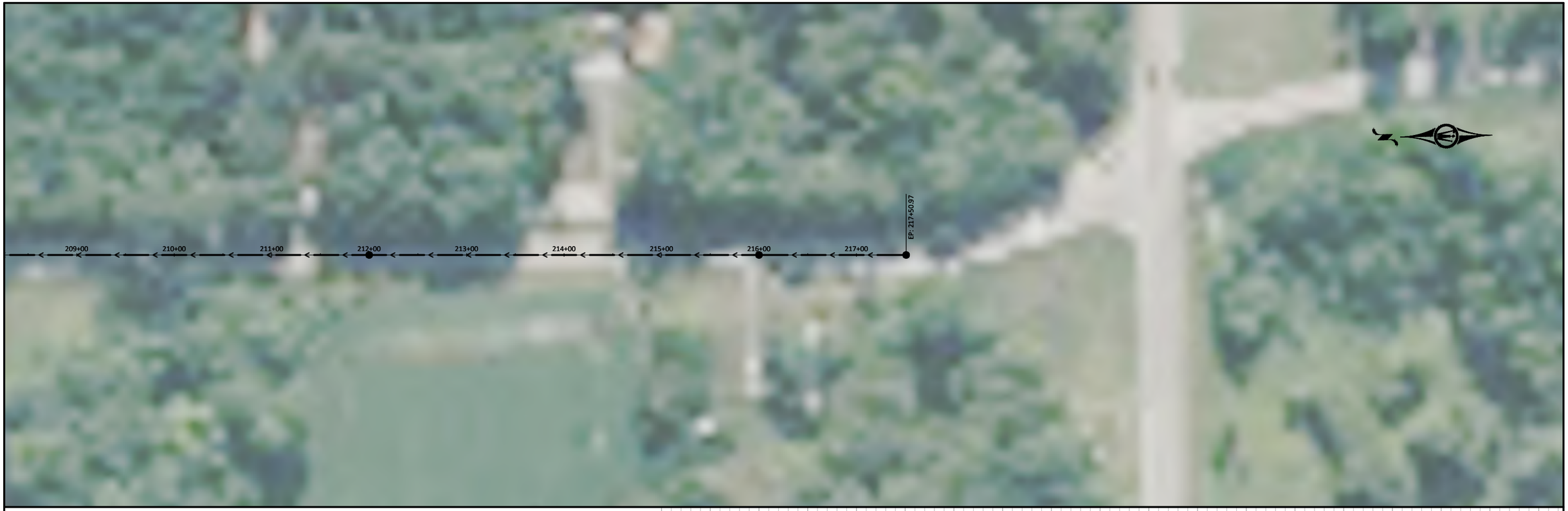
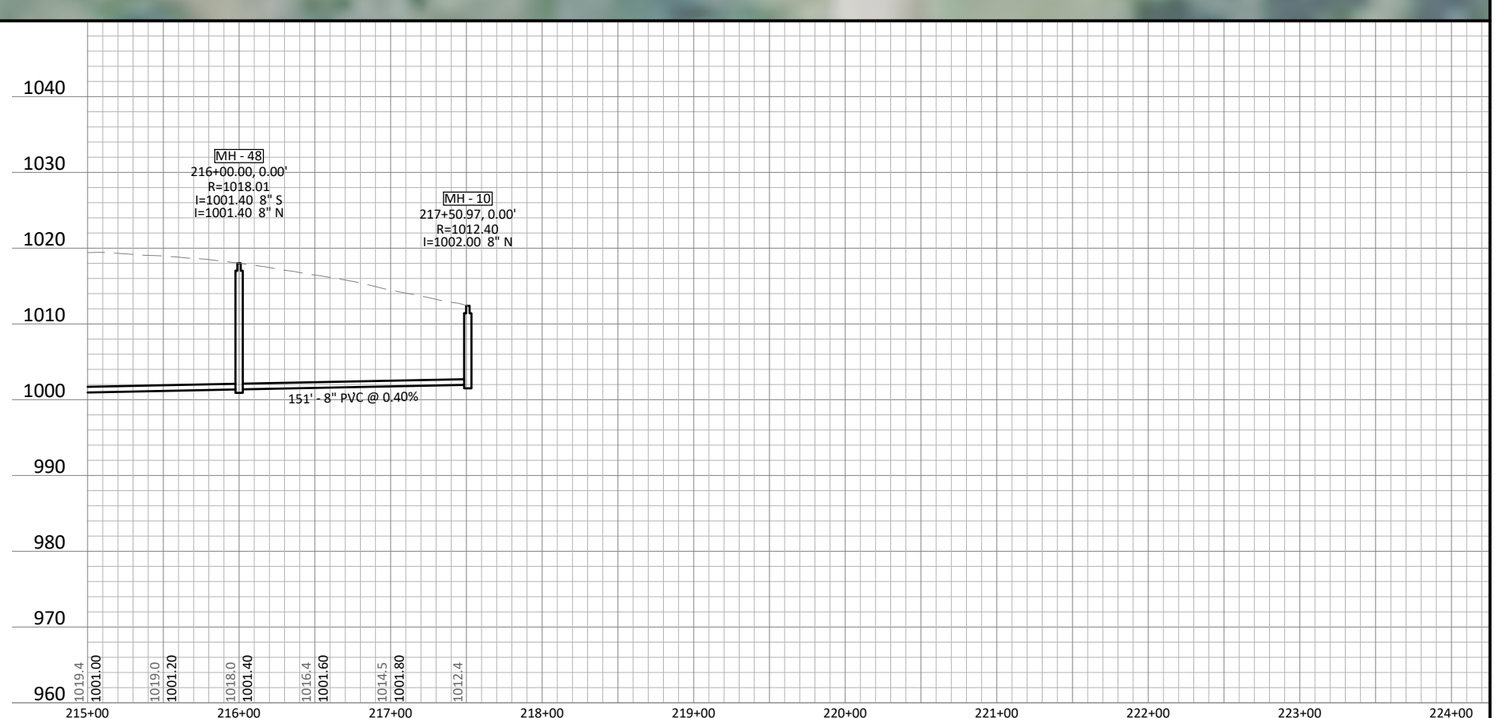
SELS - S2 ALIGNMENT

SHEET C4.57





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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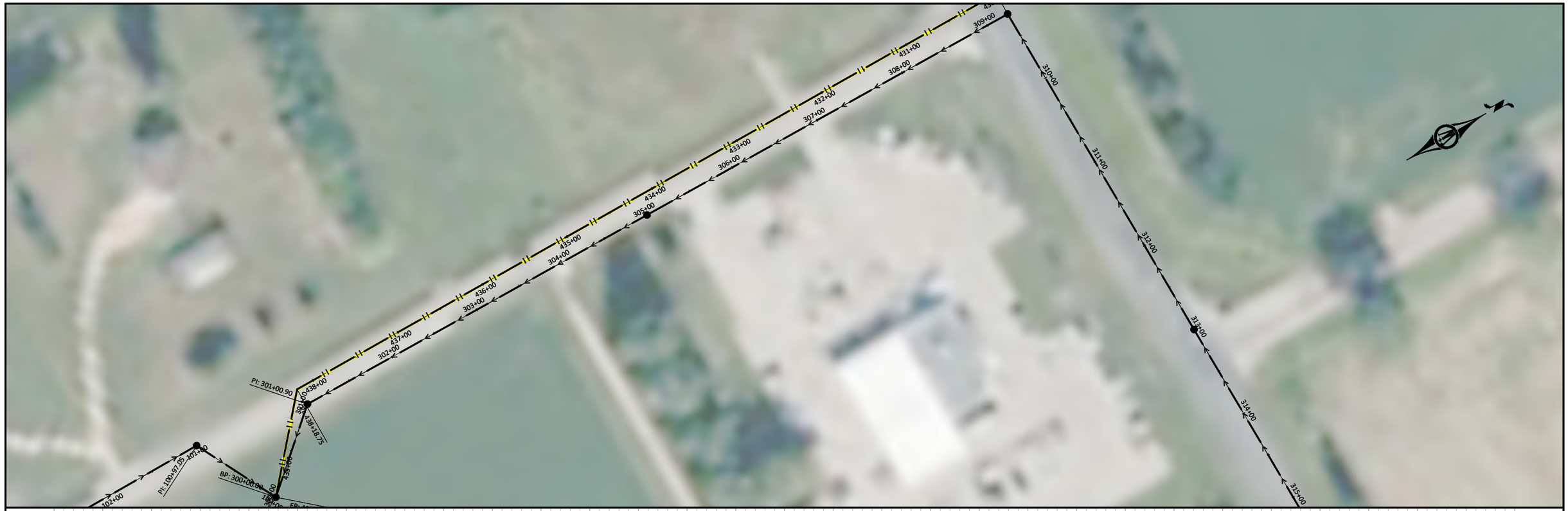
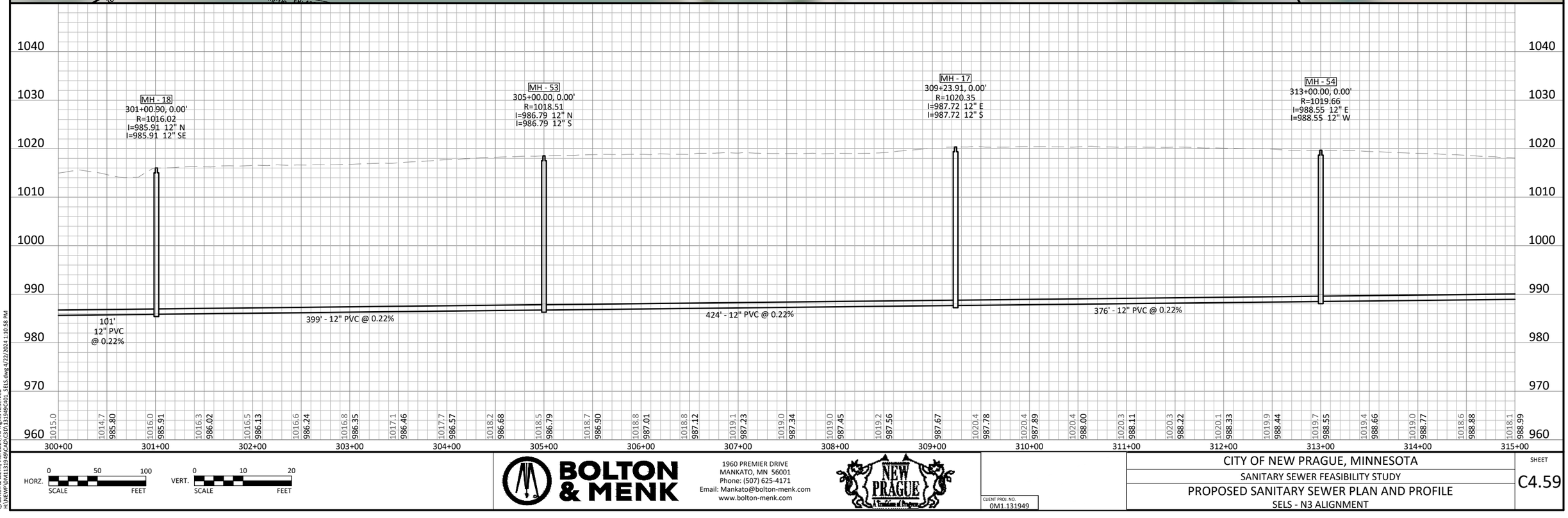
SELS - S2 ALIGNMENT

SHEET C4.58





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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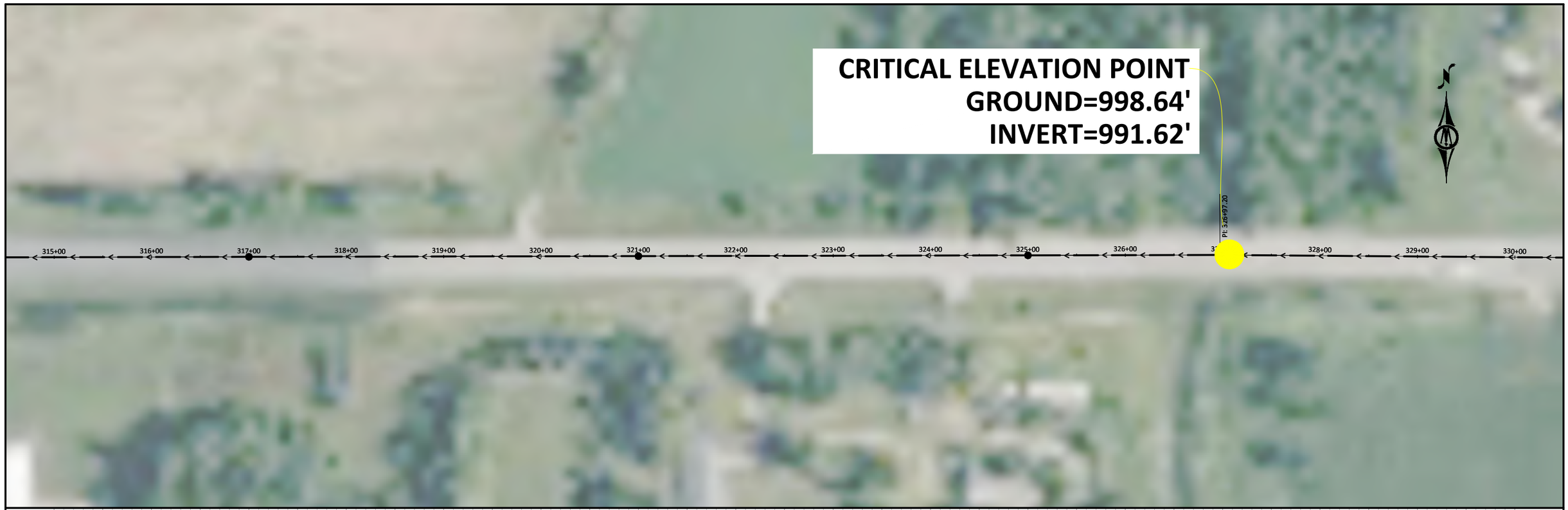
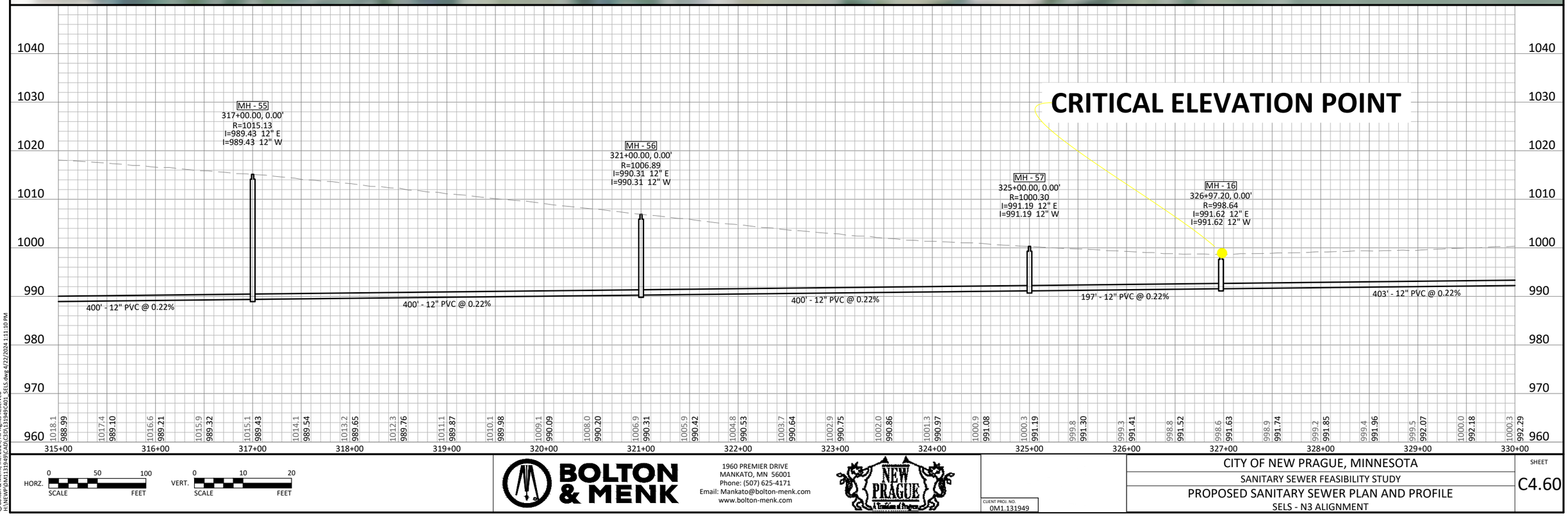
SELS - N3 ALIGNMENT

SHEET C4.59





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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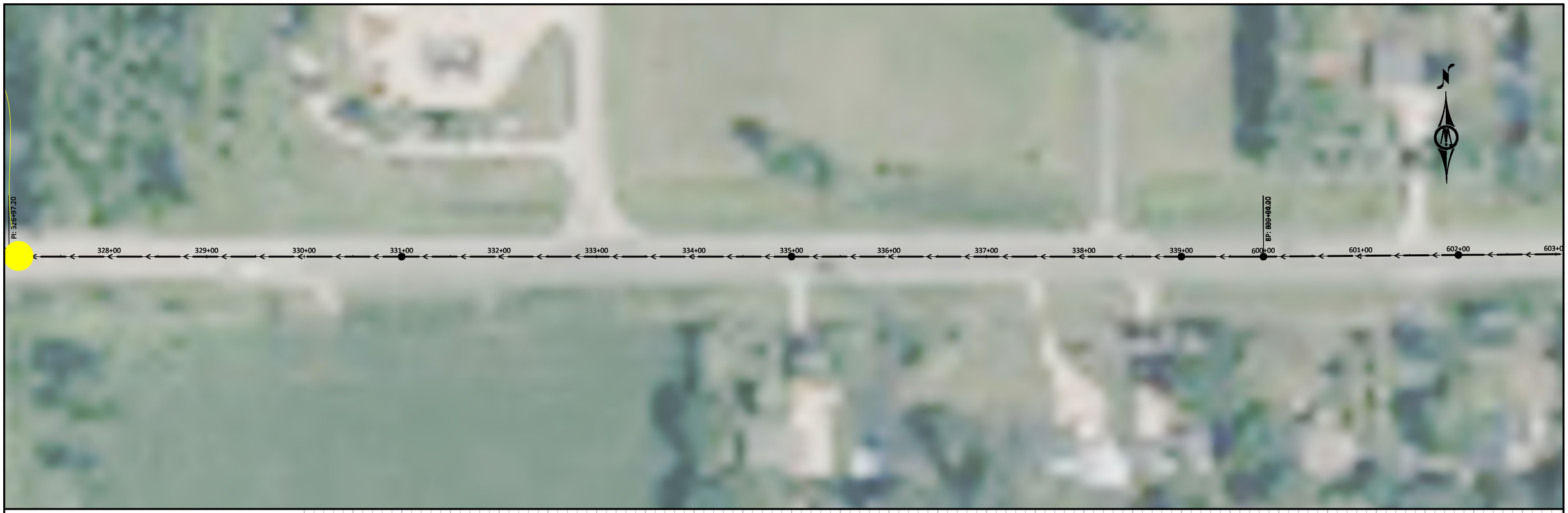
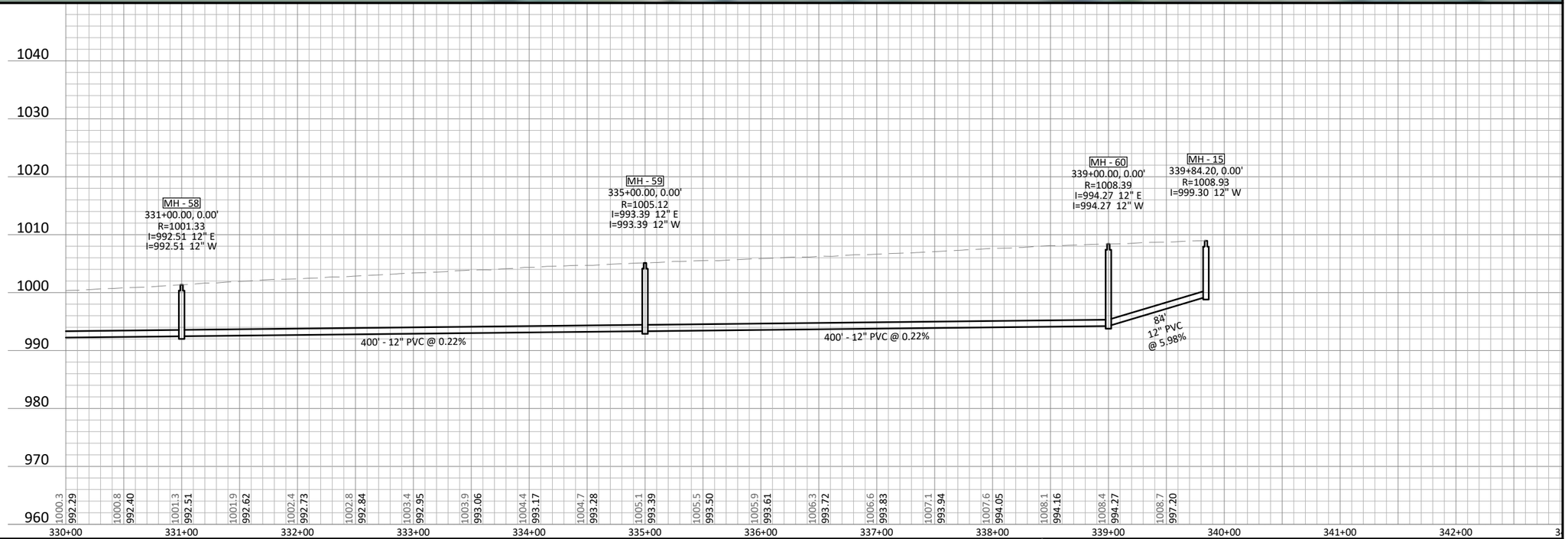
SELS - N3 ALIGNMENT

SHEET C4.60





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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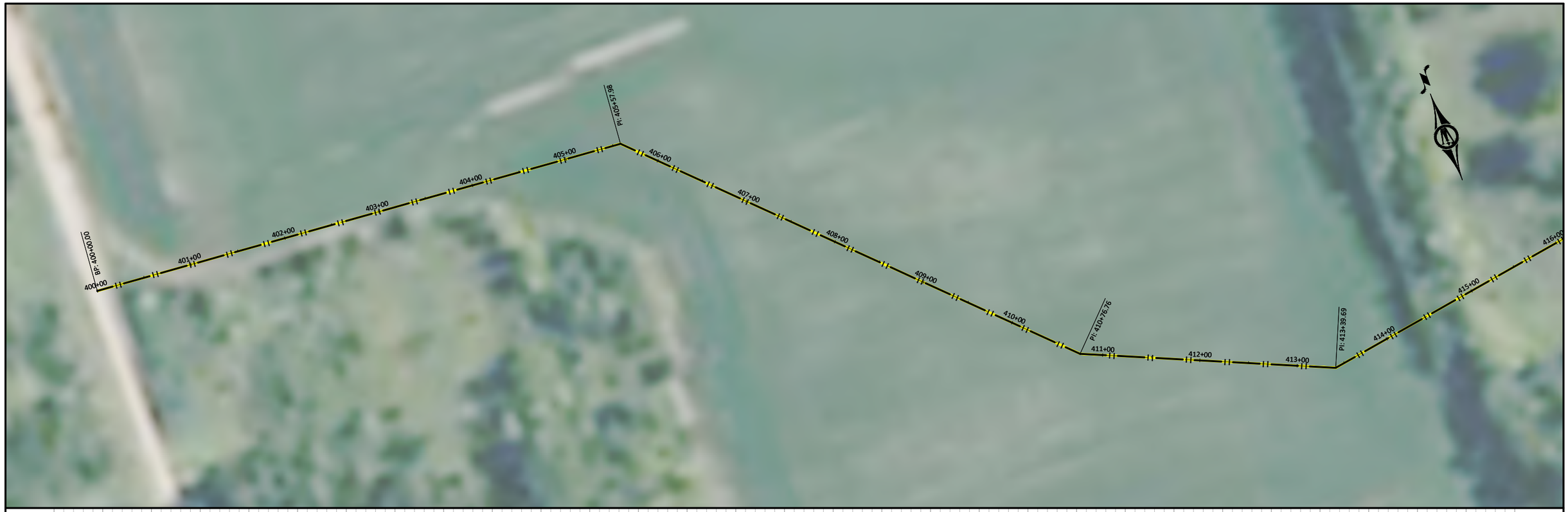
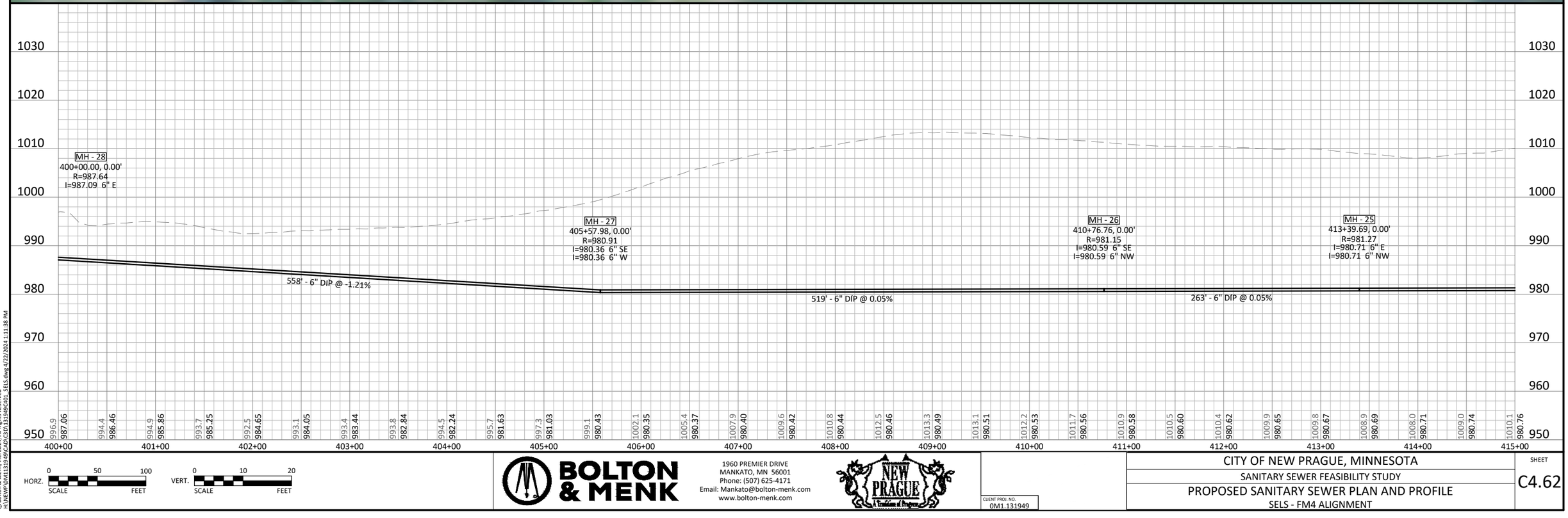
SELS - N3 ALIGNMENT

SHEET
C4.61





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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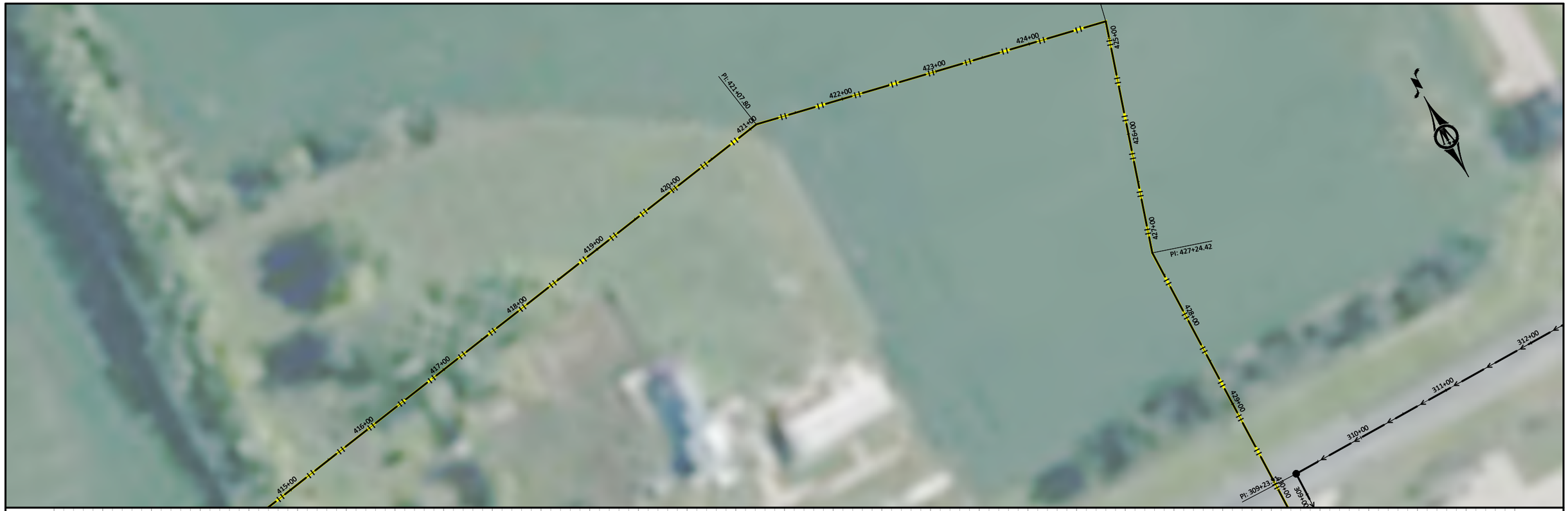
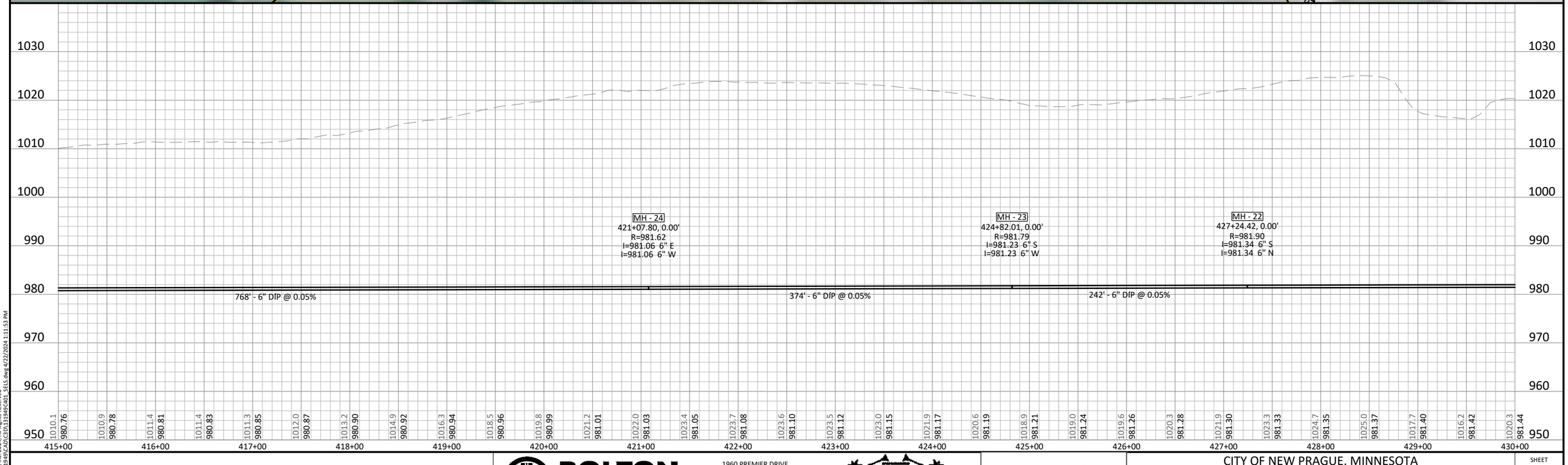
SELS - FM4 ALIGNMENT

SHEET C4.62





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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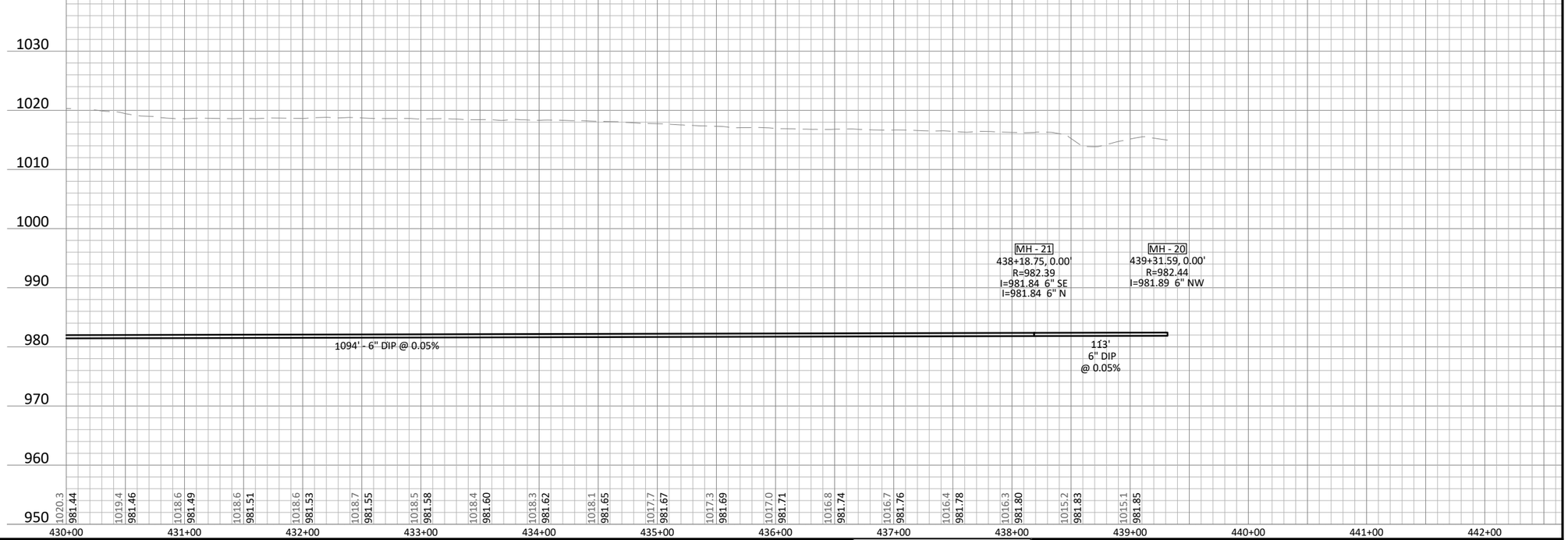
SELS - FM4 ALIGNMENT

SHEET C4.63



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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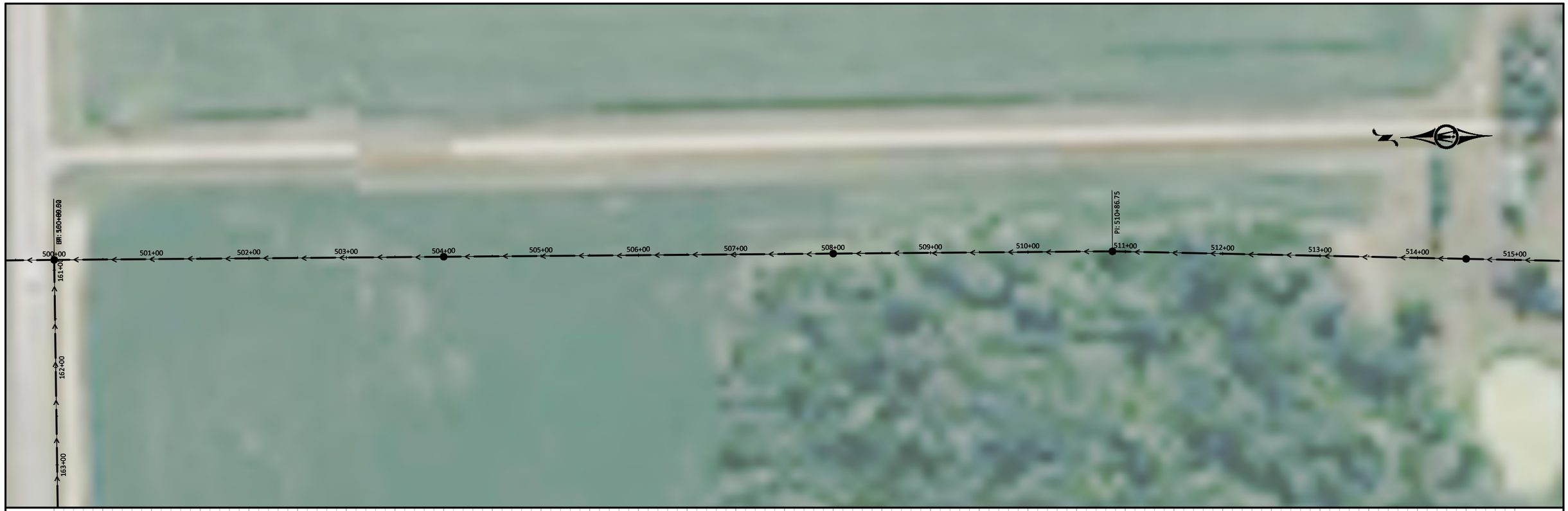
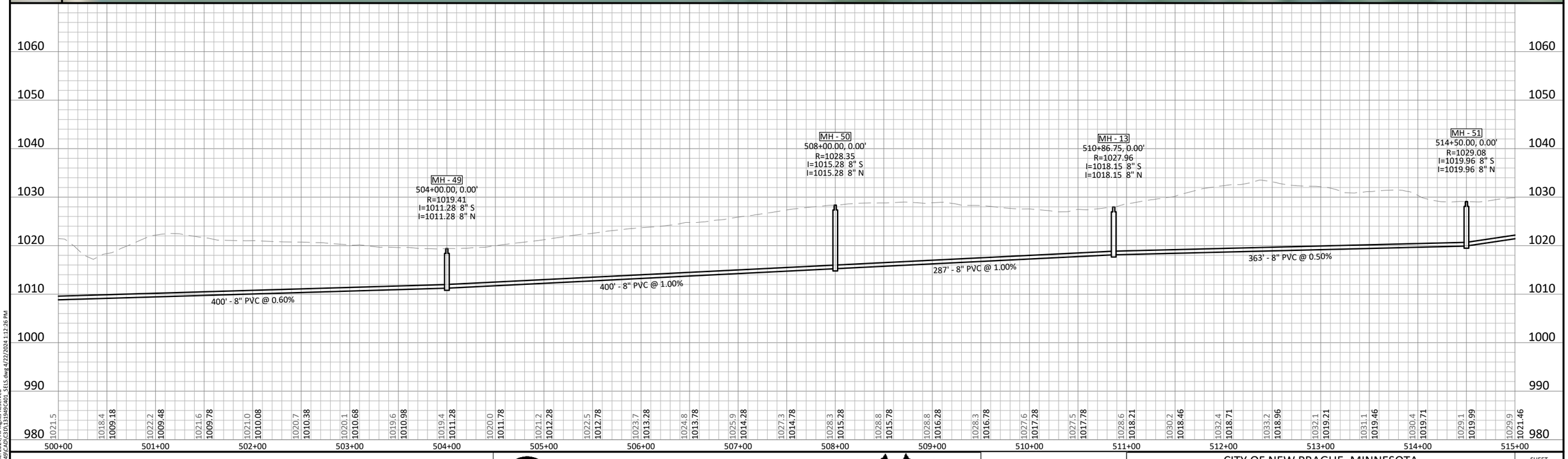
SELS - FM4 ALIGNMENT

SHEET
C4.64





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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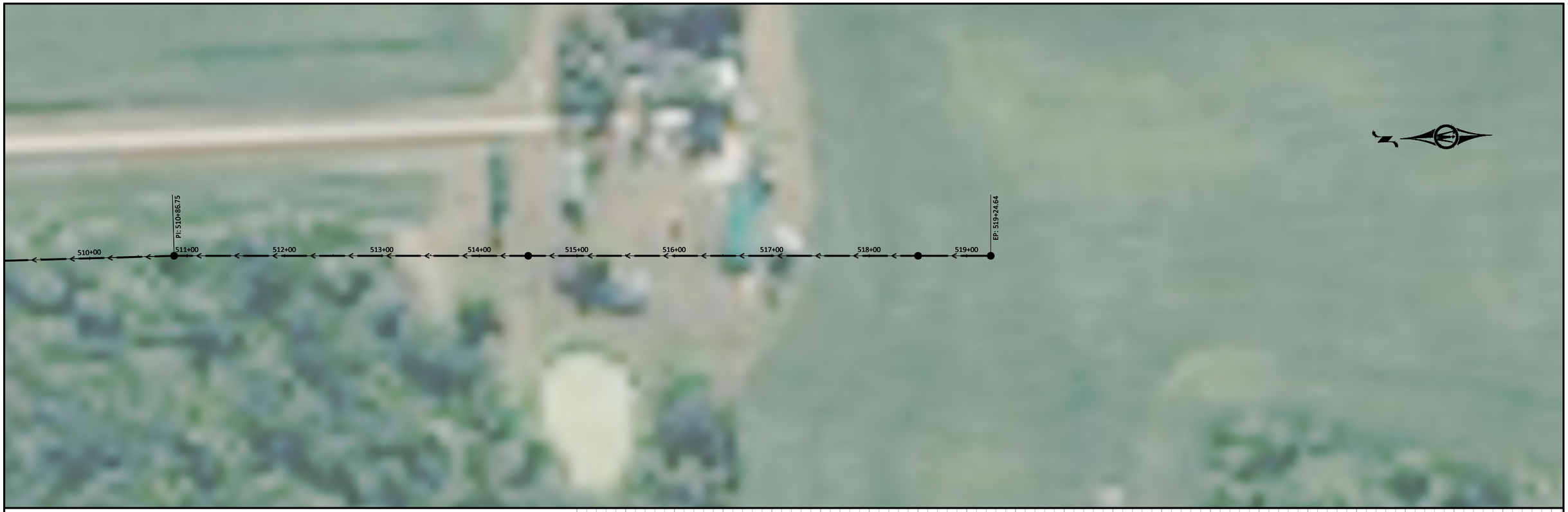
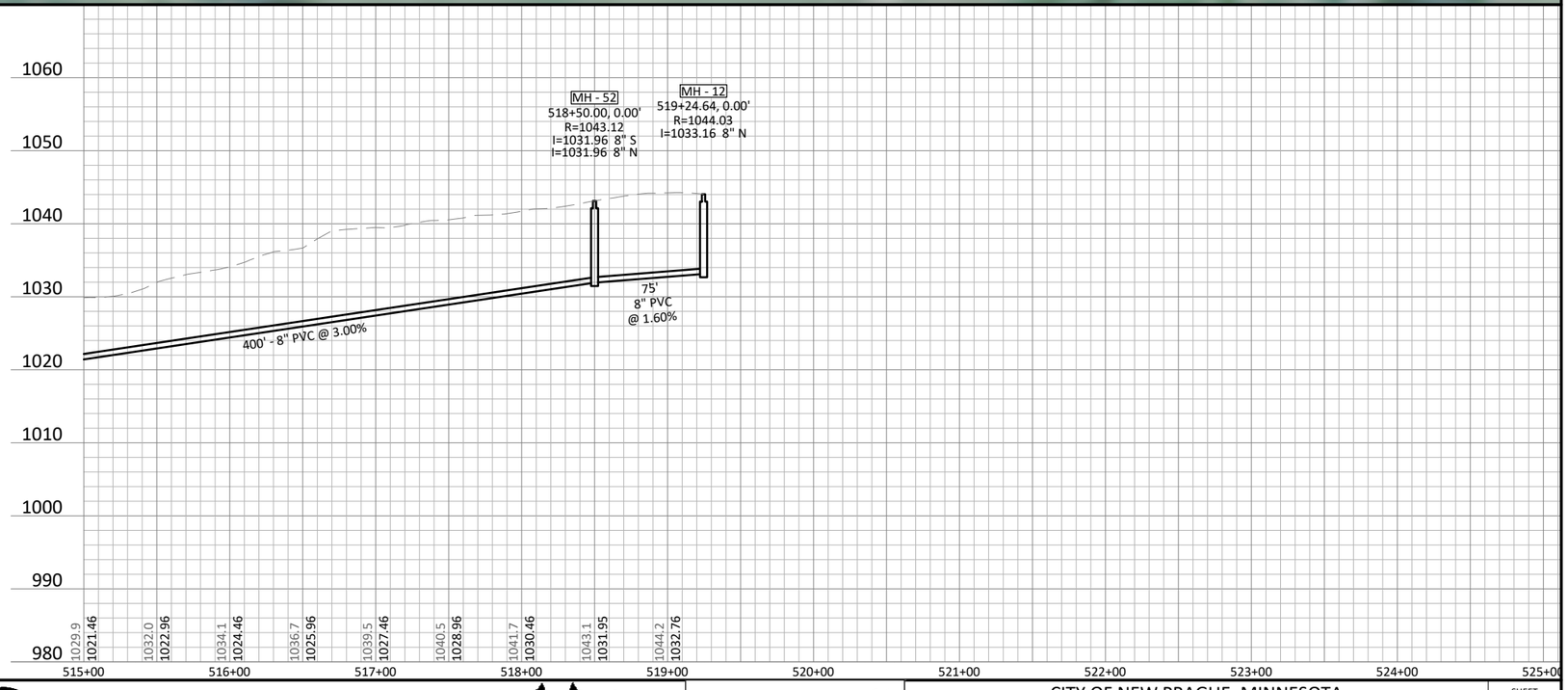
SHEET C4.65





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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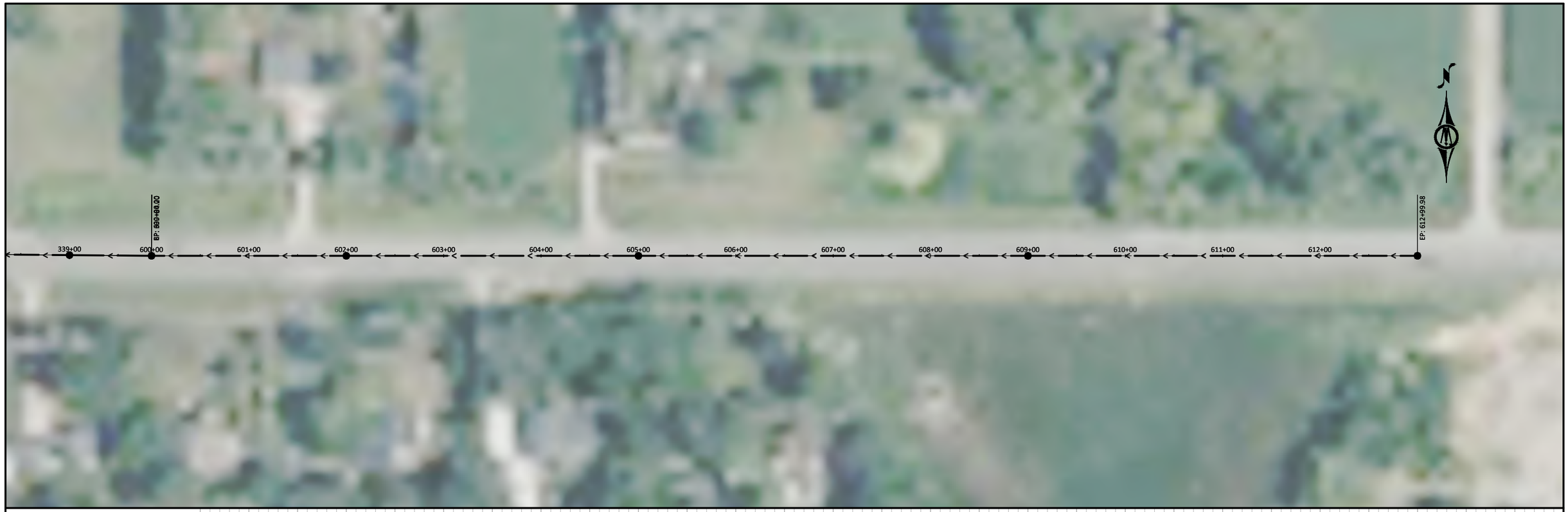
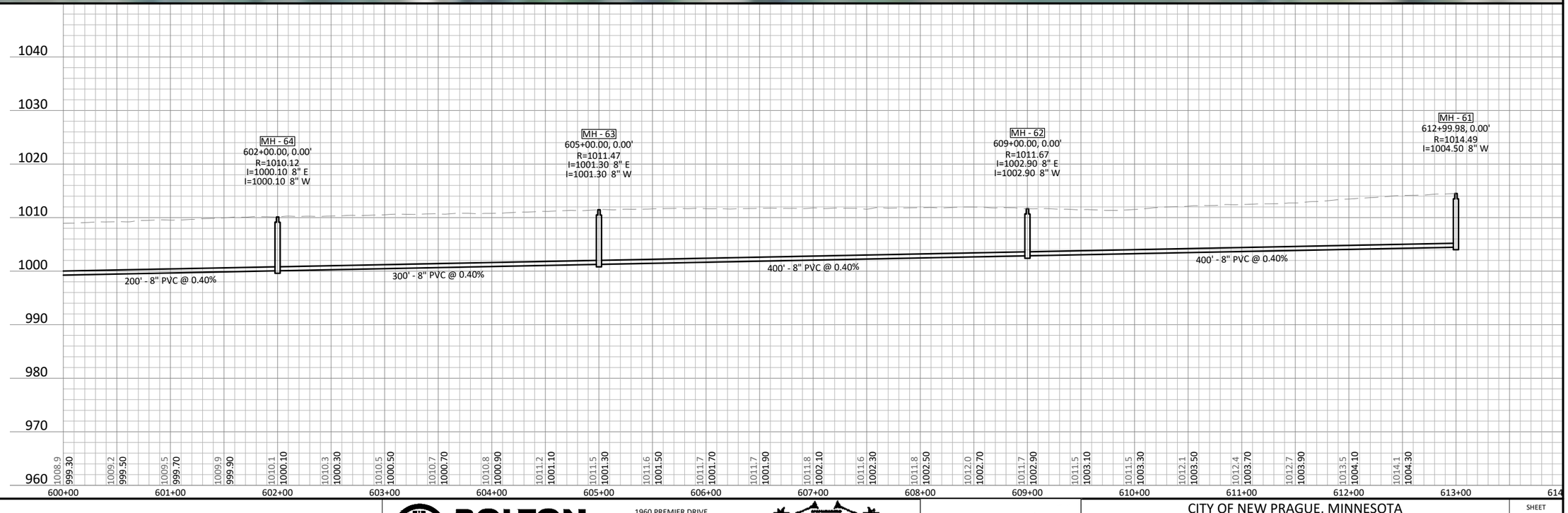
SELS - S5 ALIGNMENT

SHEET C4.66





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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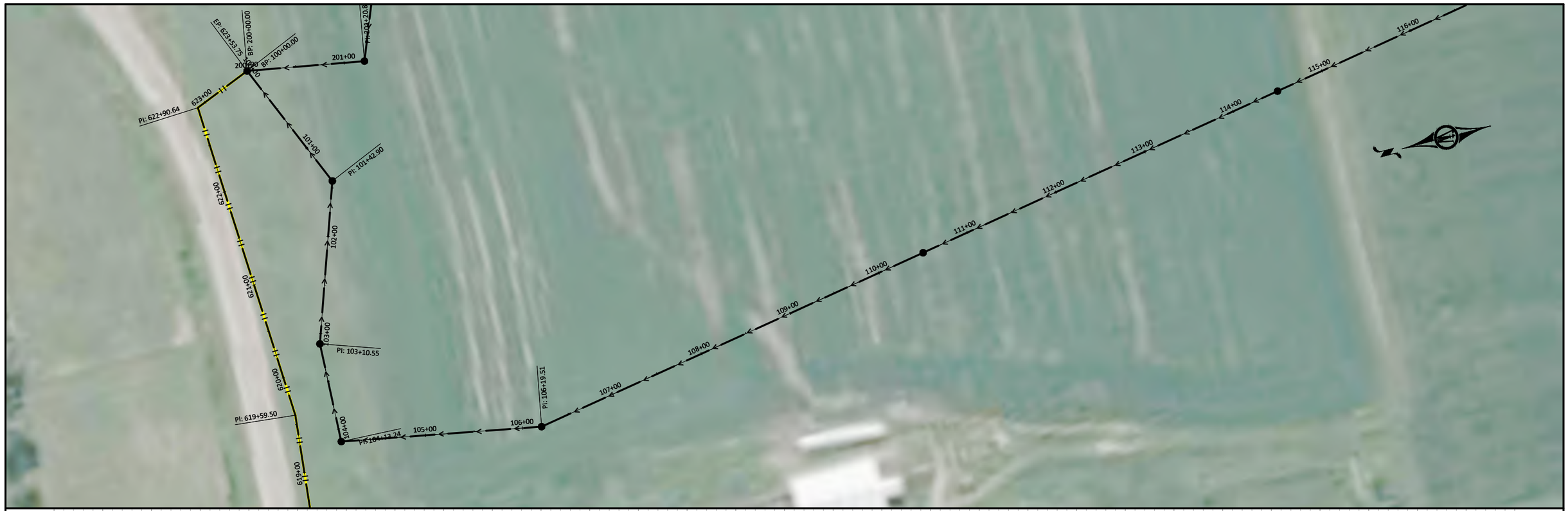
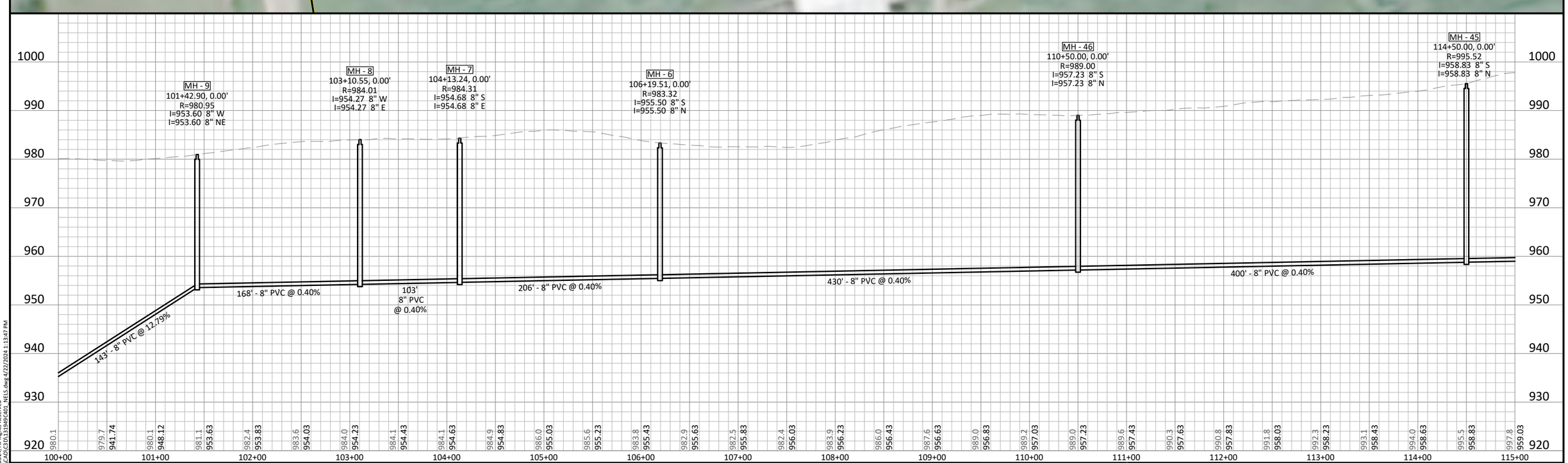
SELS - N6 ALIGNMENT

SHEET
C4.67





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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NELS - S1 ALIGNMENT

SHEET C4.68

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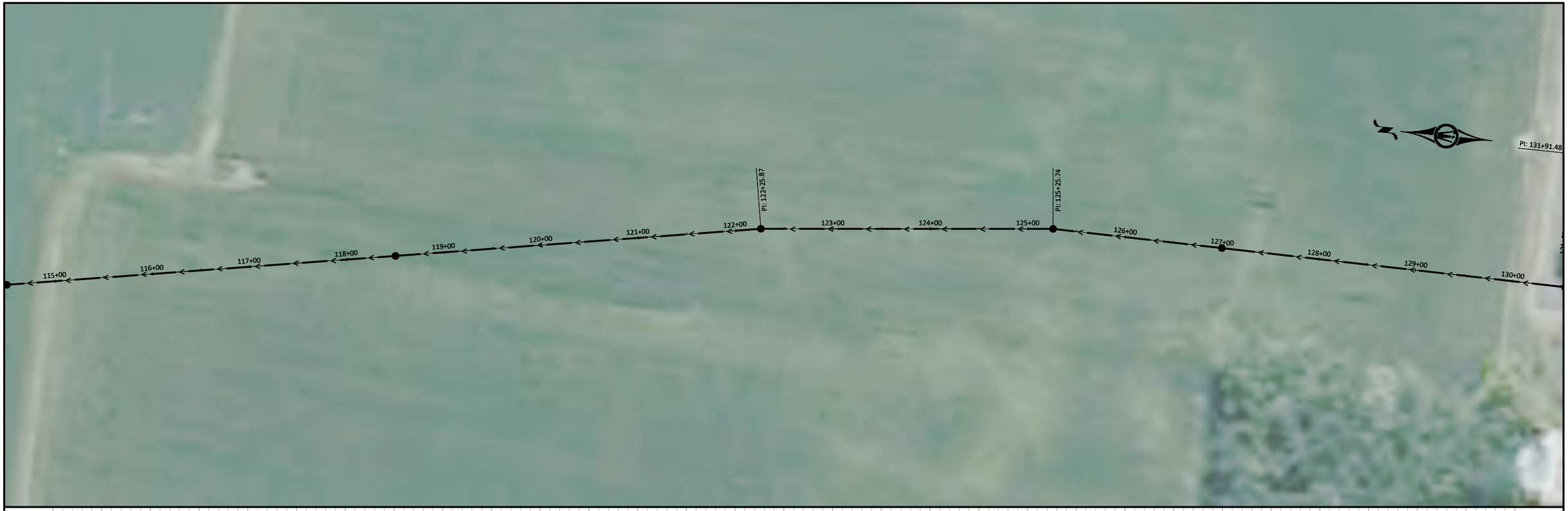

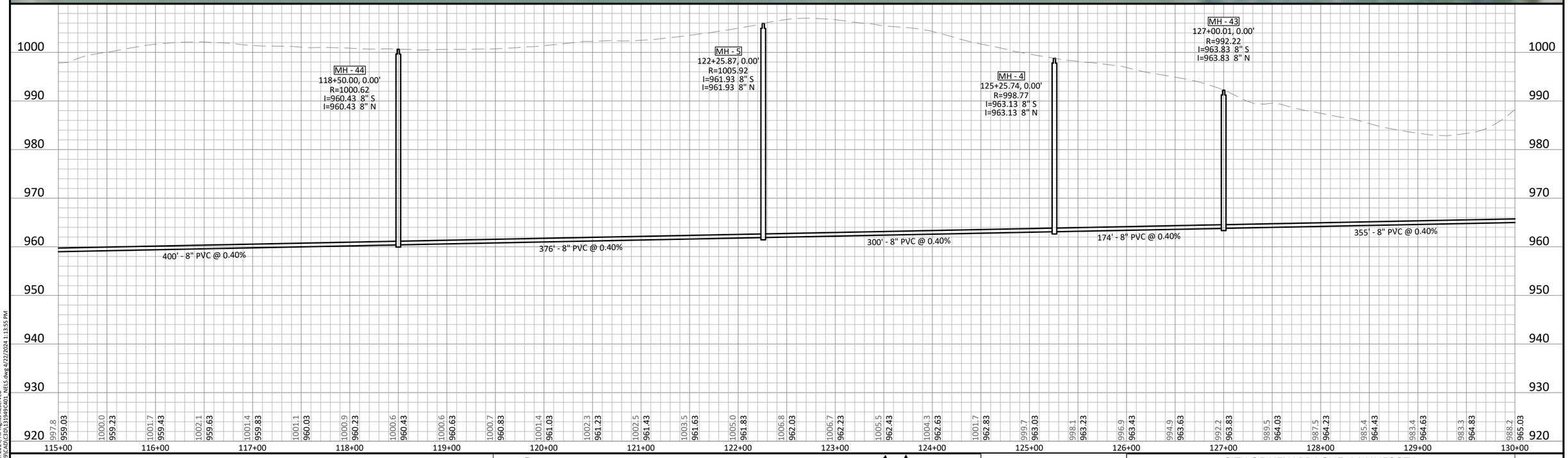

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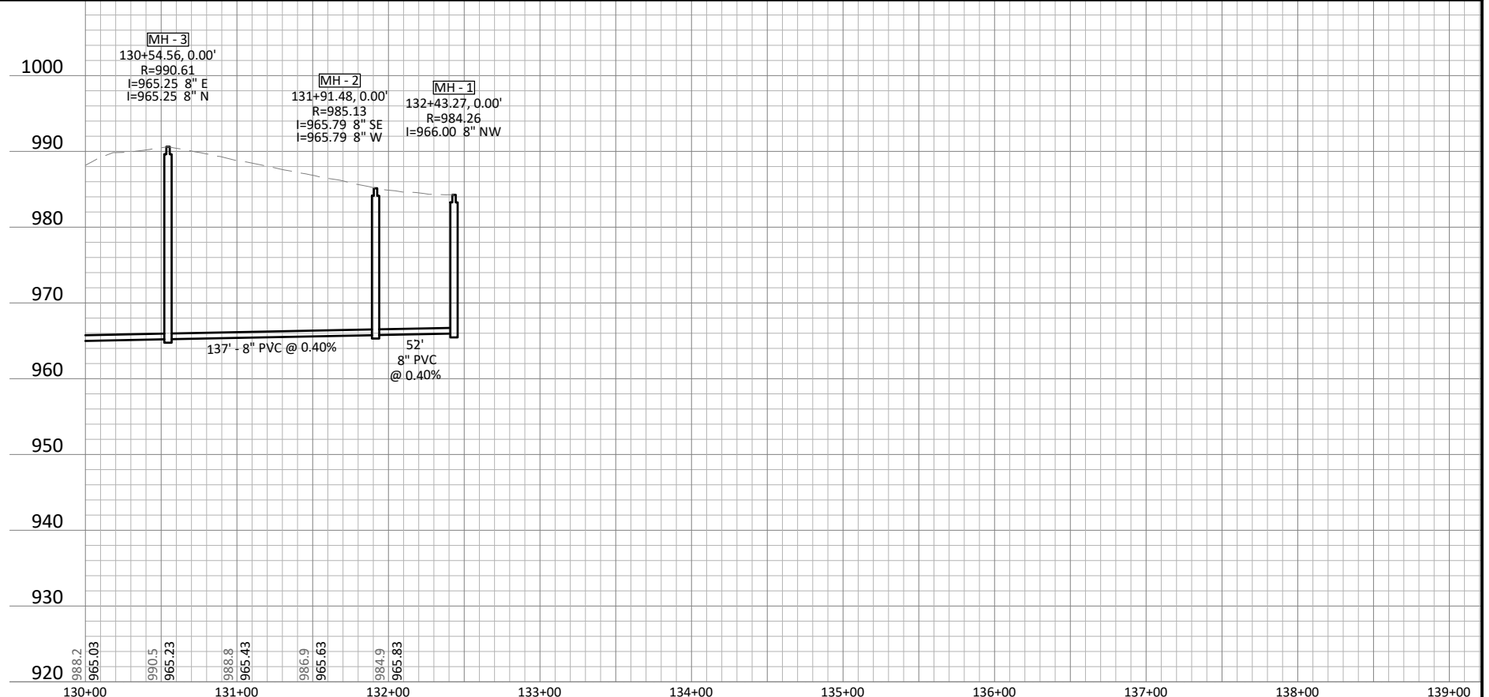
NELS - S1 ALIGNMENT

SHEET
C4.69



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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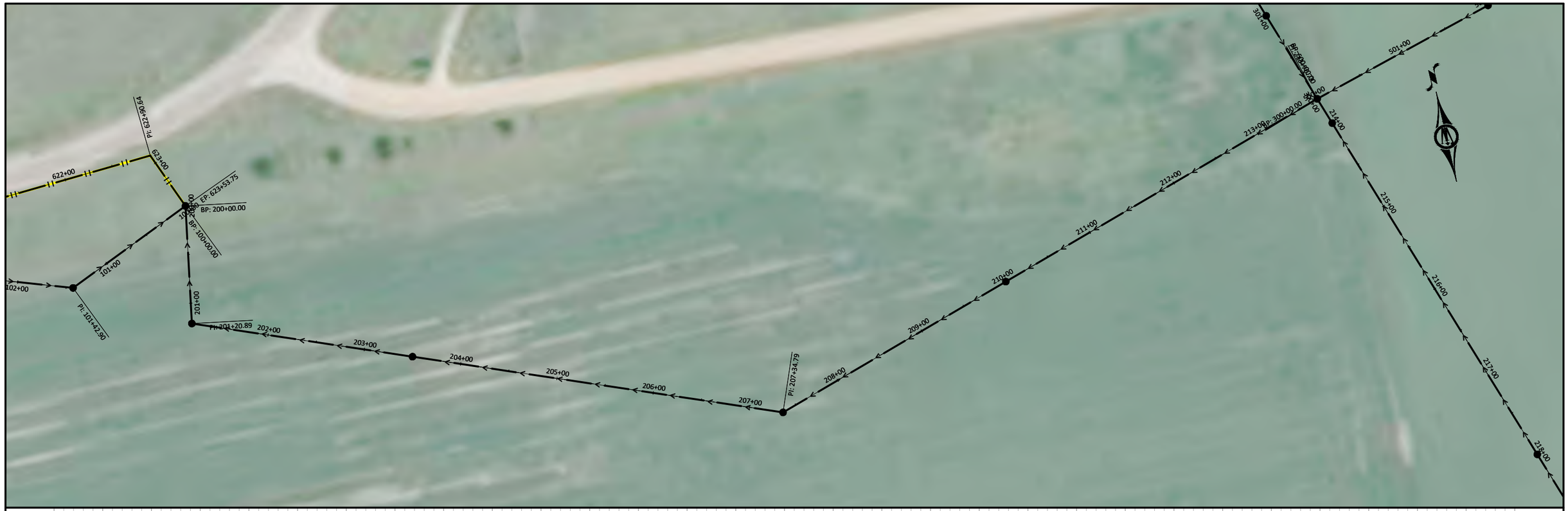
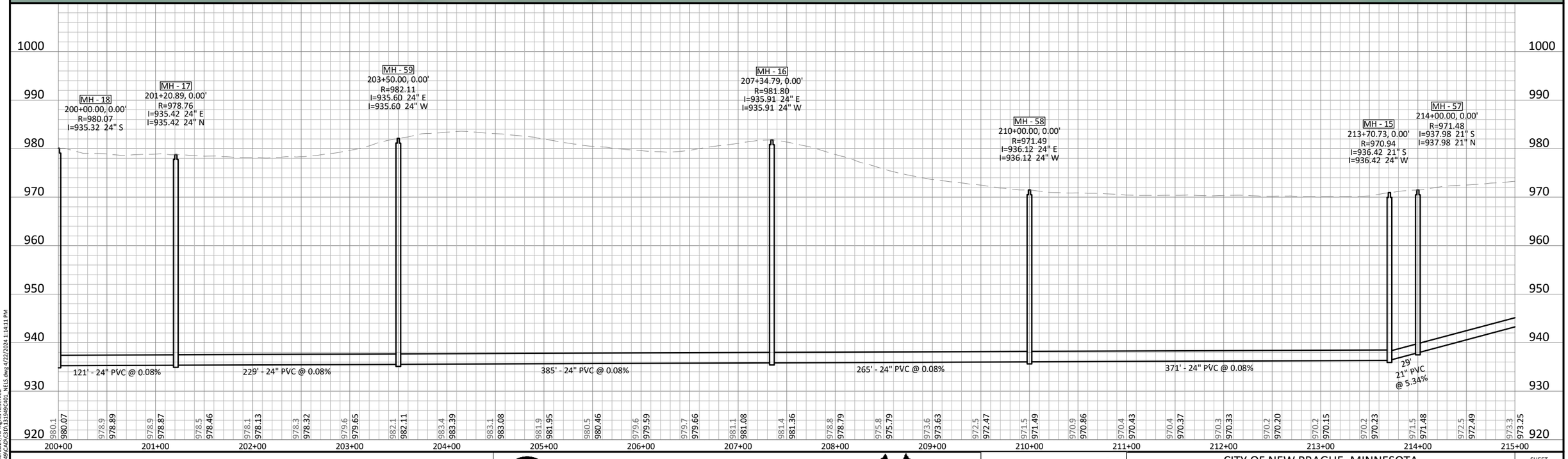
NELS - S1 ALIGNMENT

SHEET C4.70





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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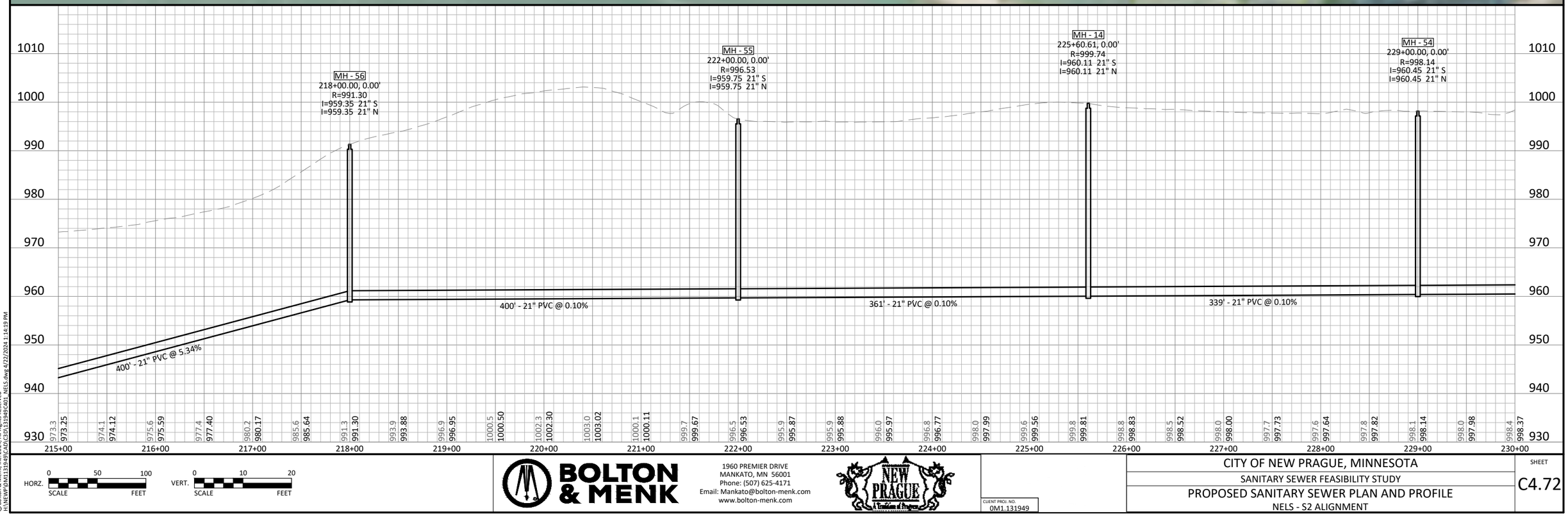
NELS - S2 ALIGNMENT

SHEET C4.71



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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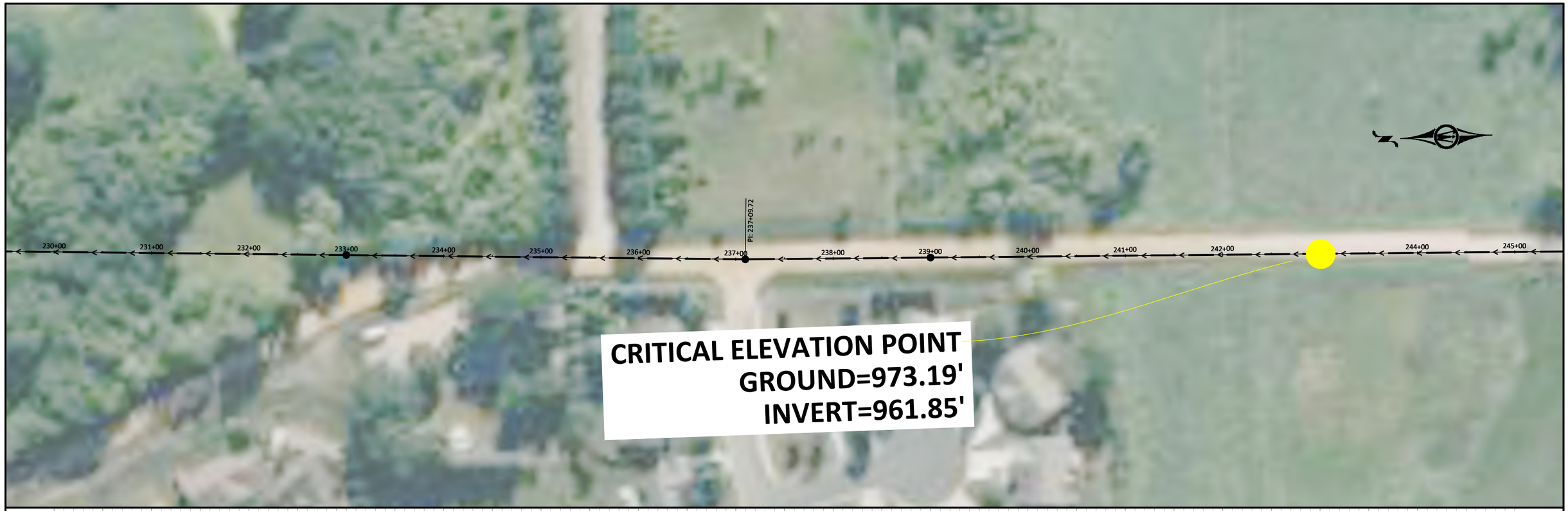
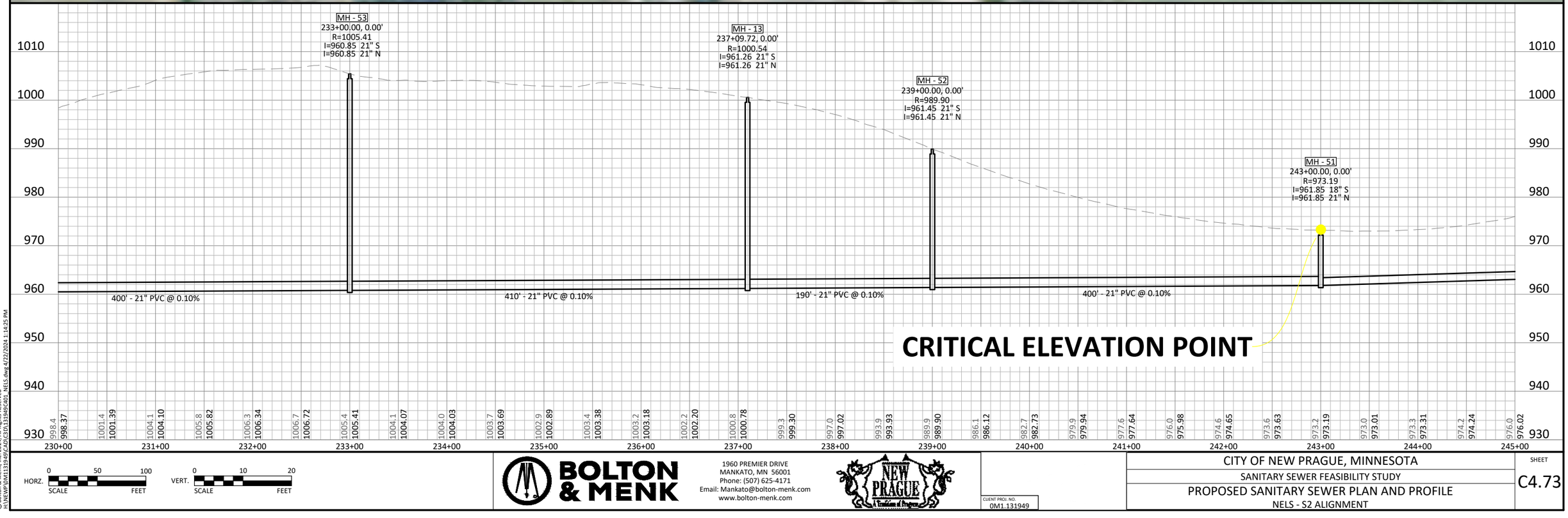
NELS - S2 ALIGNMENT

SHEET C4.72





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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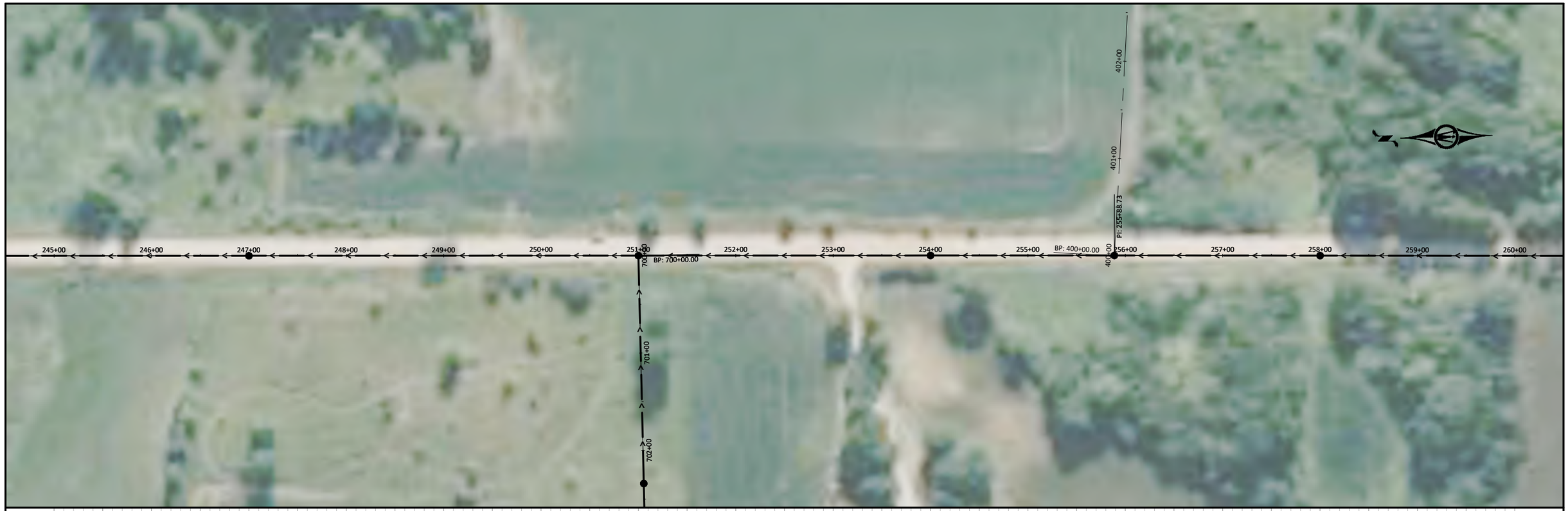
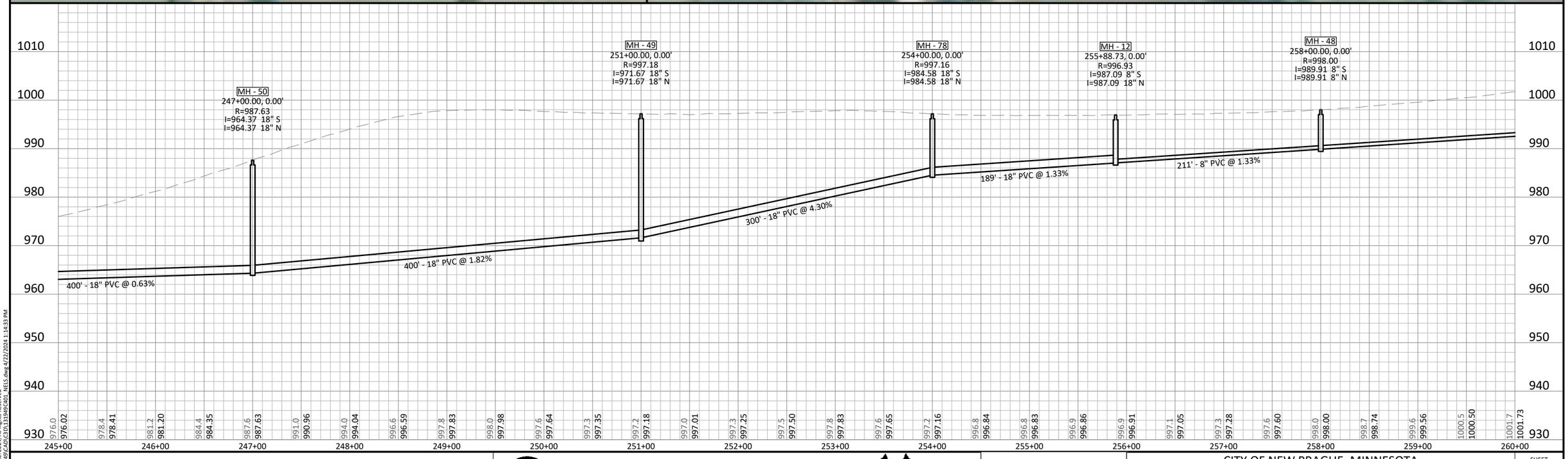
NELS - S2 ALIGNMENT

SHEET C4.73





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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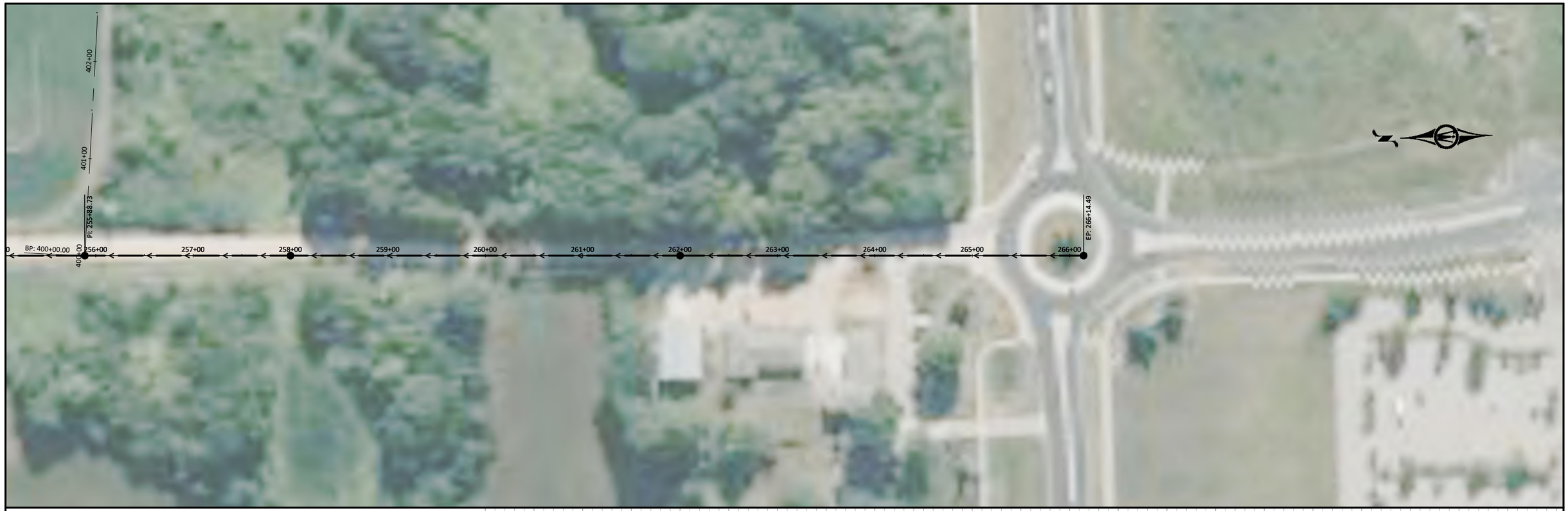
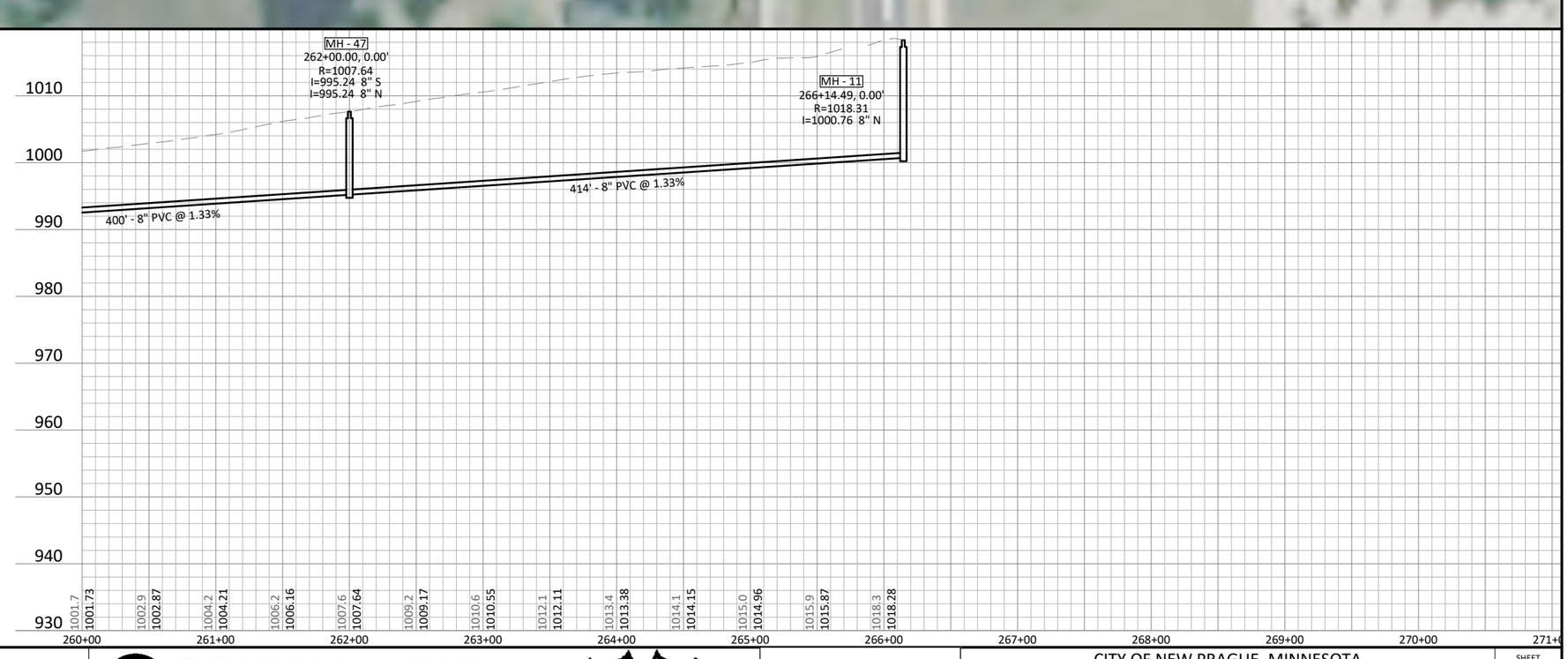
NELS - S2 ALIGNMENT

SHEET C4.74





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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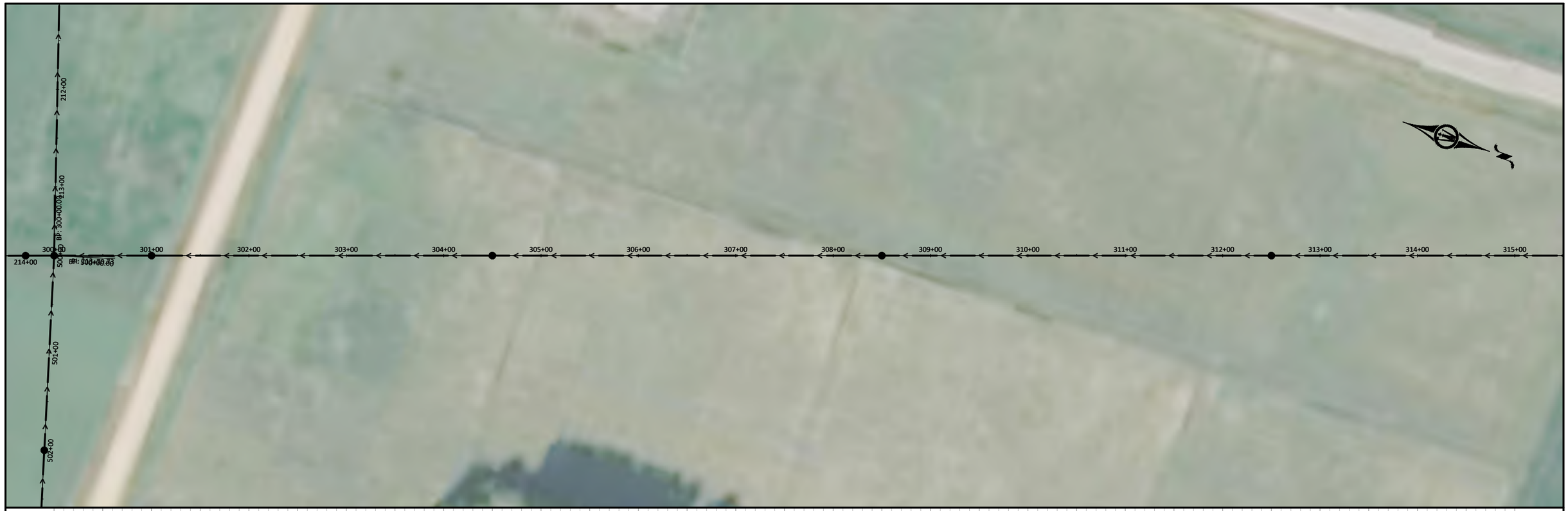
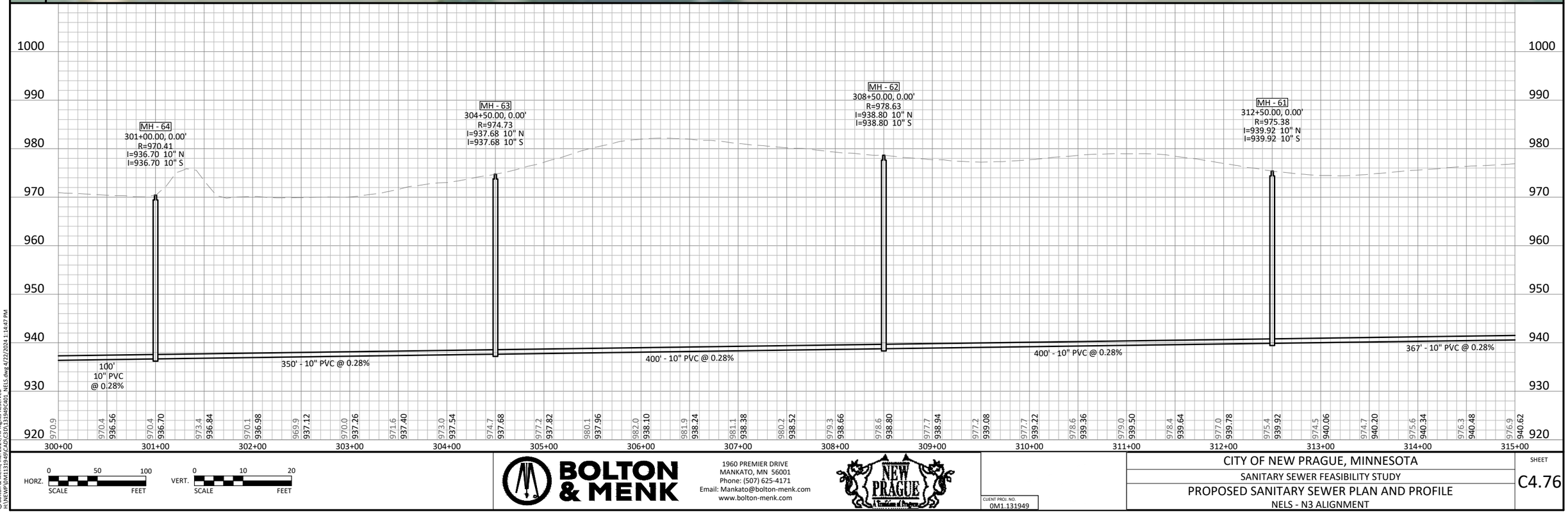
NELS - S2 ALIGNMENT

SHEET
C4.75





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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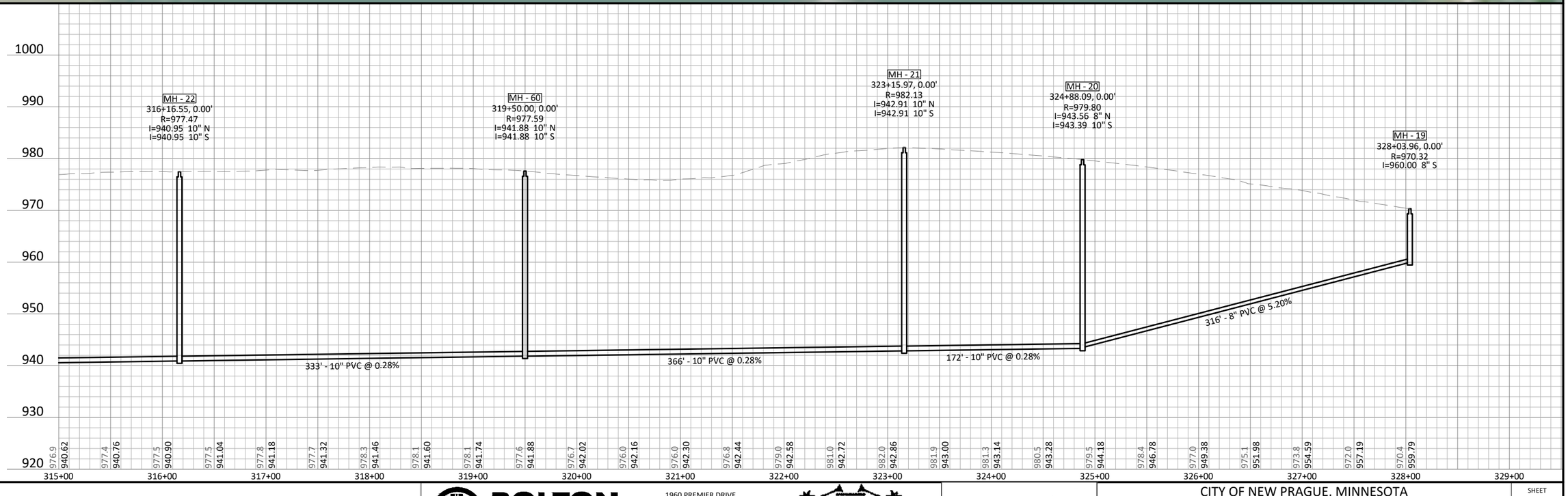
NELS - N3 ALIGNMENT

SHEET C4.76



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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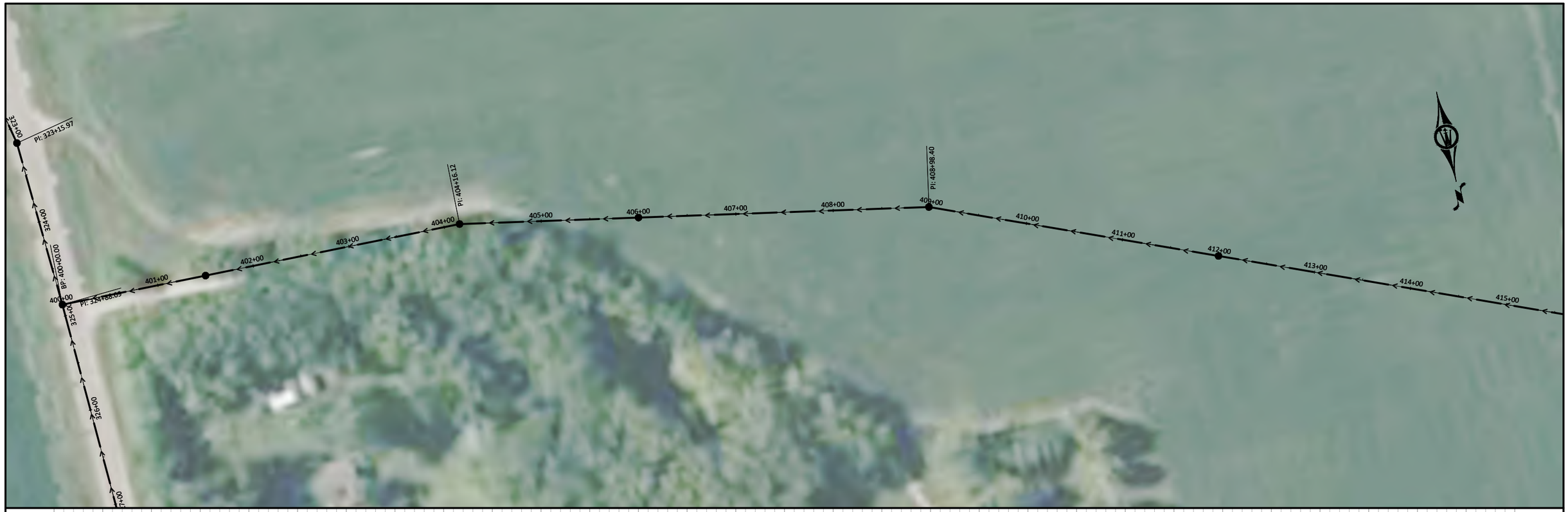
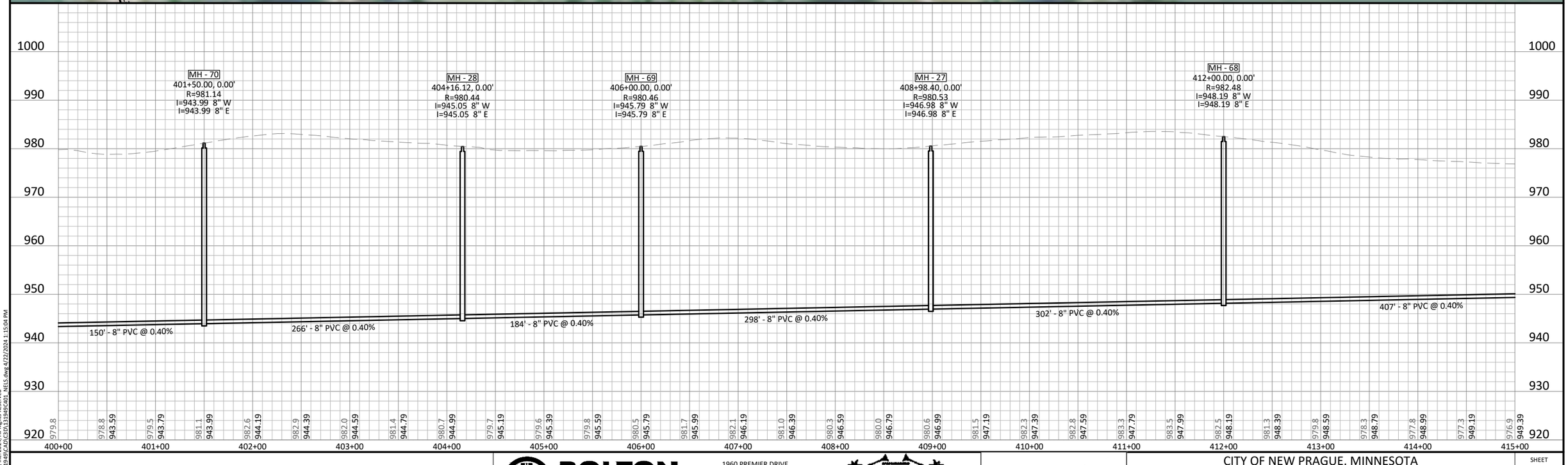
NELS - N3 ALIGNMENT

SHEET C4.77





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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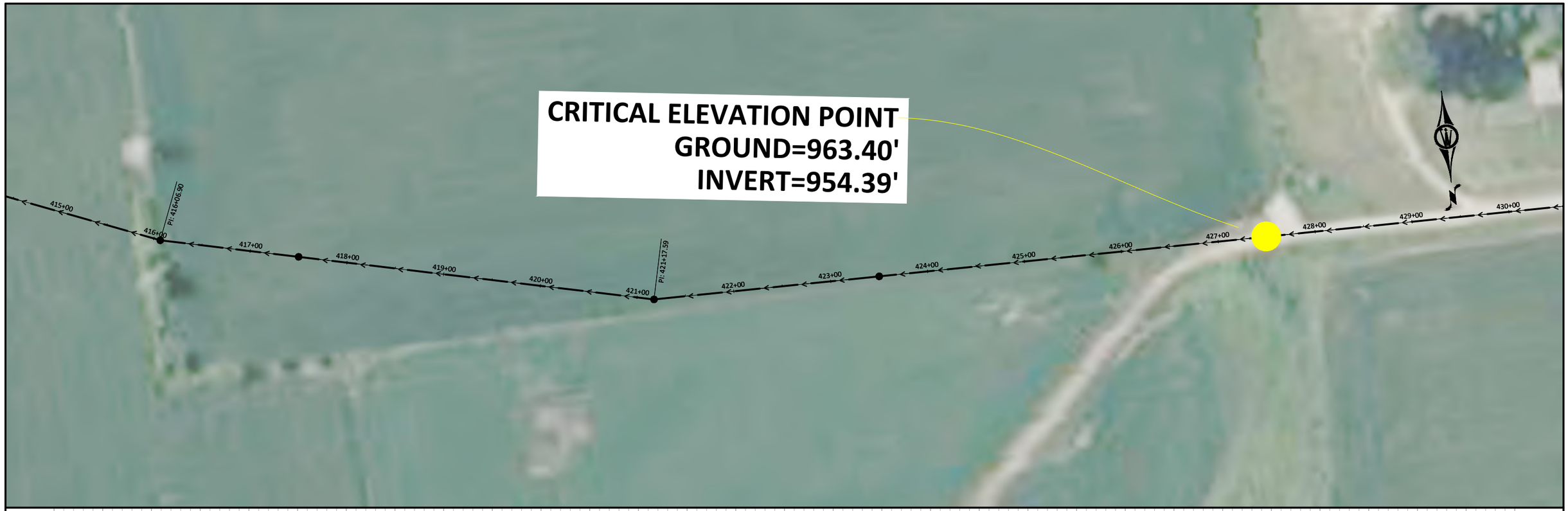
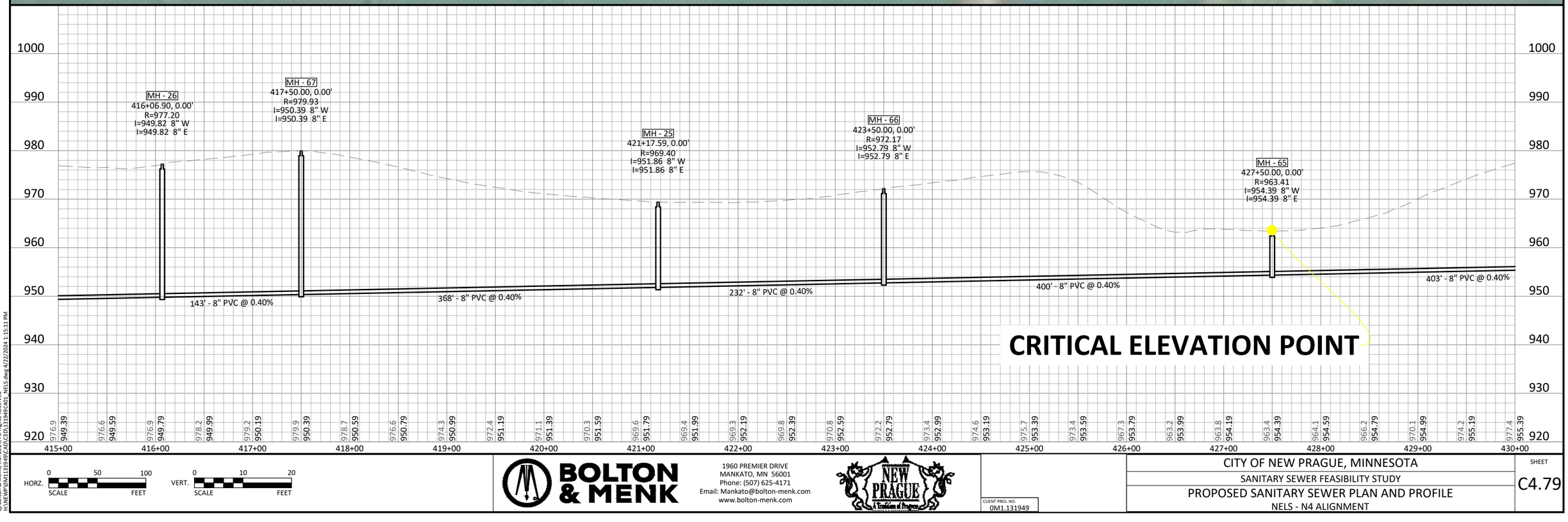
NELS - N4 ALIGNMENT

SHEET C4.78





HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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NELS - N4 ALIGNMENT

SHEET C4.79

HORZ. SCALE 0 50 100 FEET
VERT. SCALE 0 10 20 FEET

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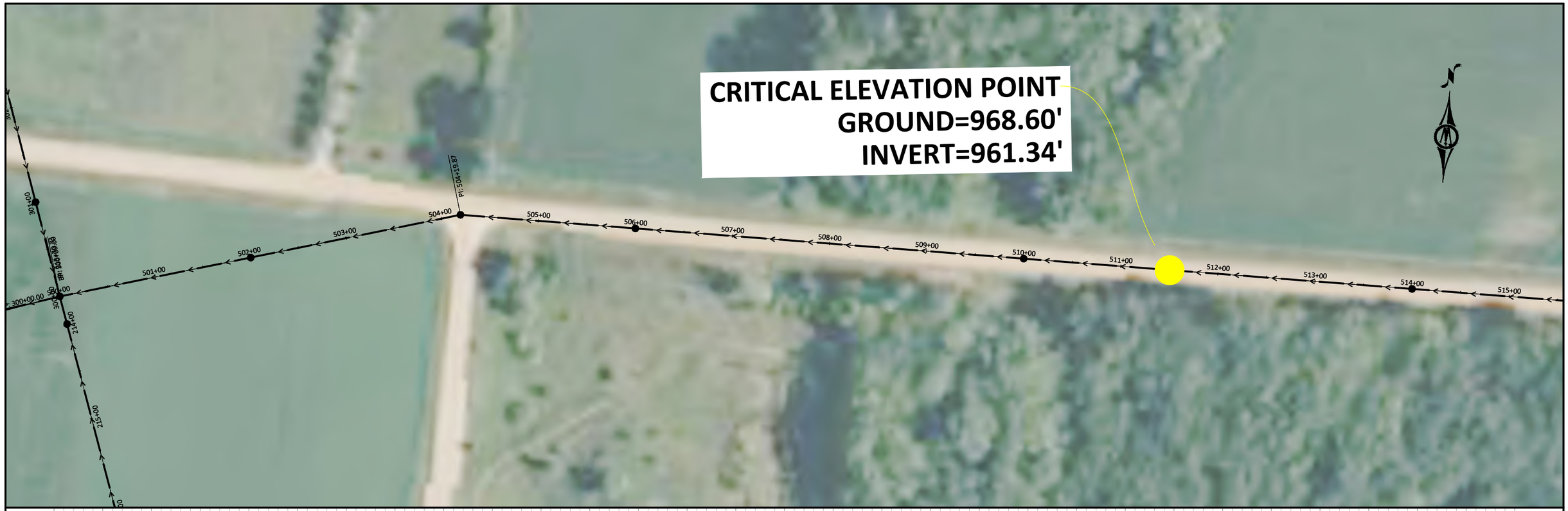
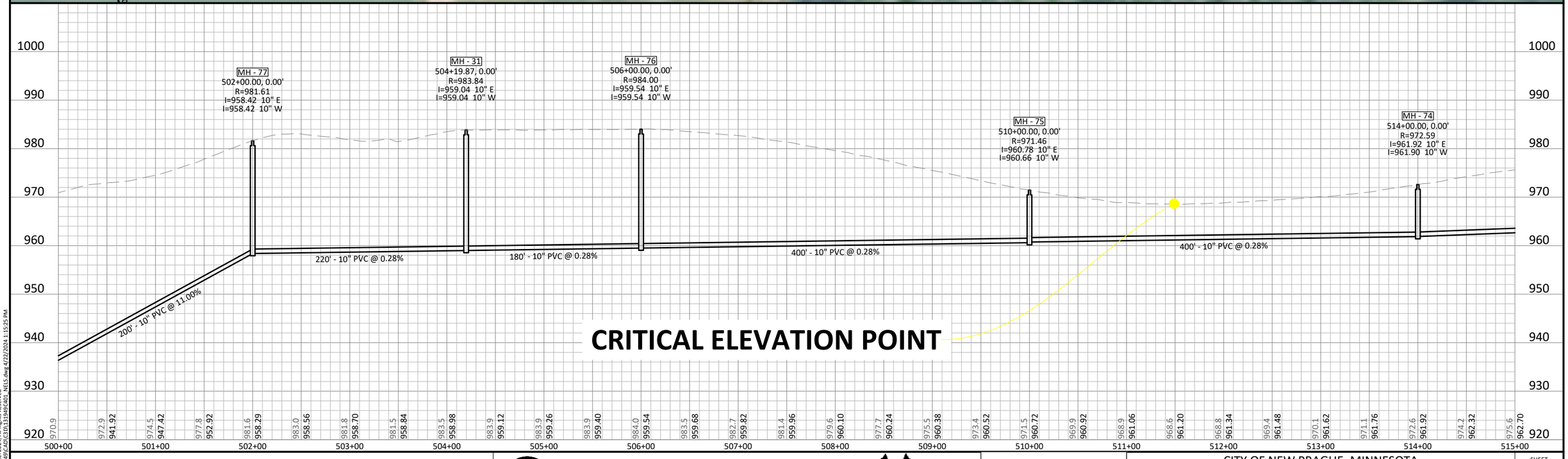
NELS - N4 ALIGNMENT

SHEET
C4.80





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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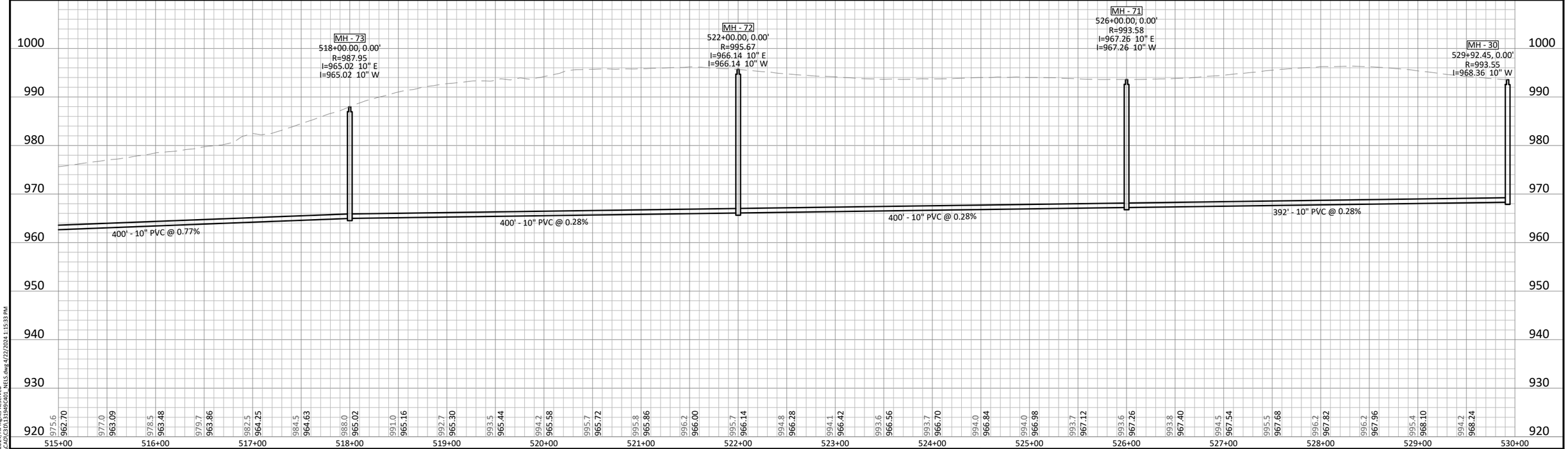
NELS - E5 ALIGNMENT

SHEET C4.81



HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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NELS - E5 ALIGNMENT

SHEET
C4.82

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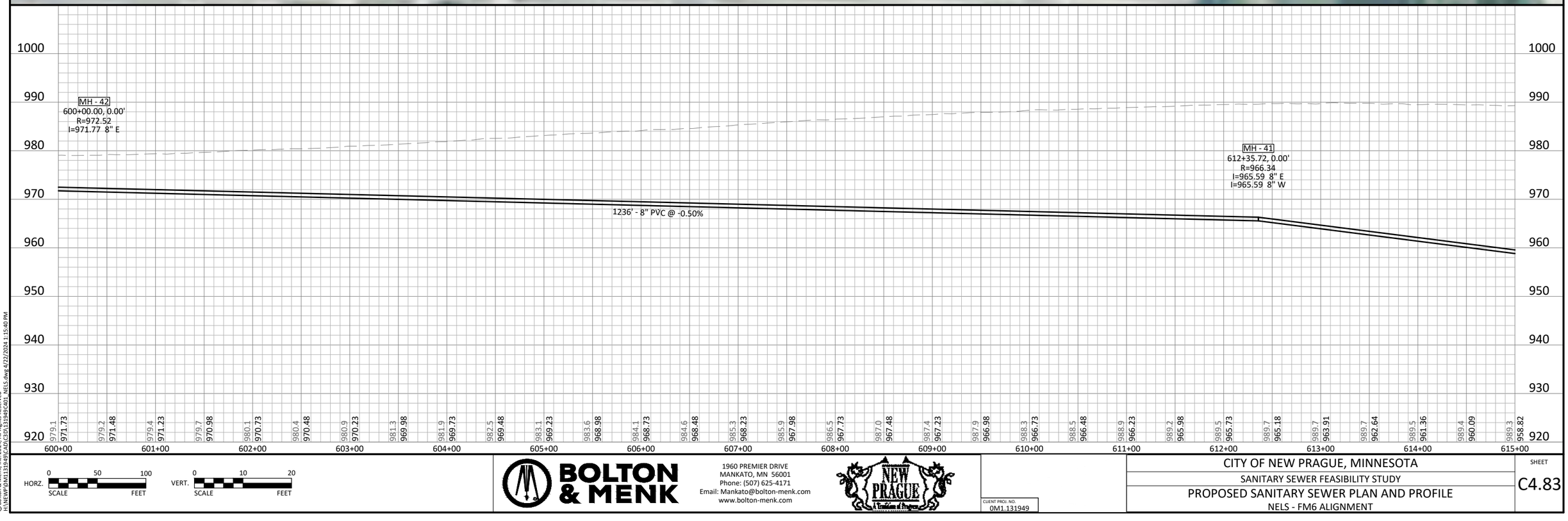

HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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NELS - FM6 ALIGNMENT

SHEET C4.83

HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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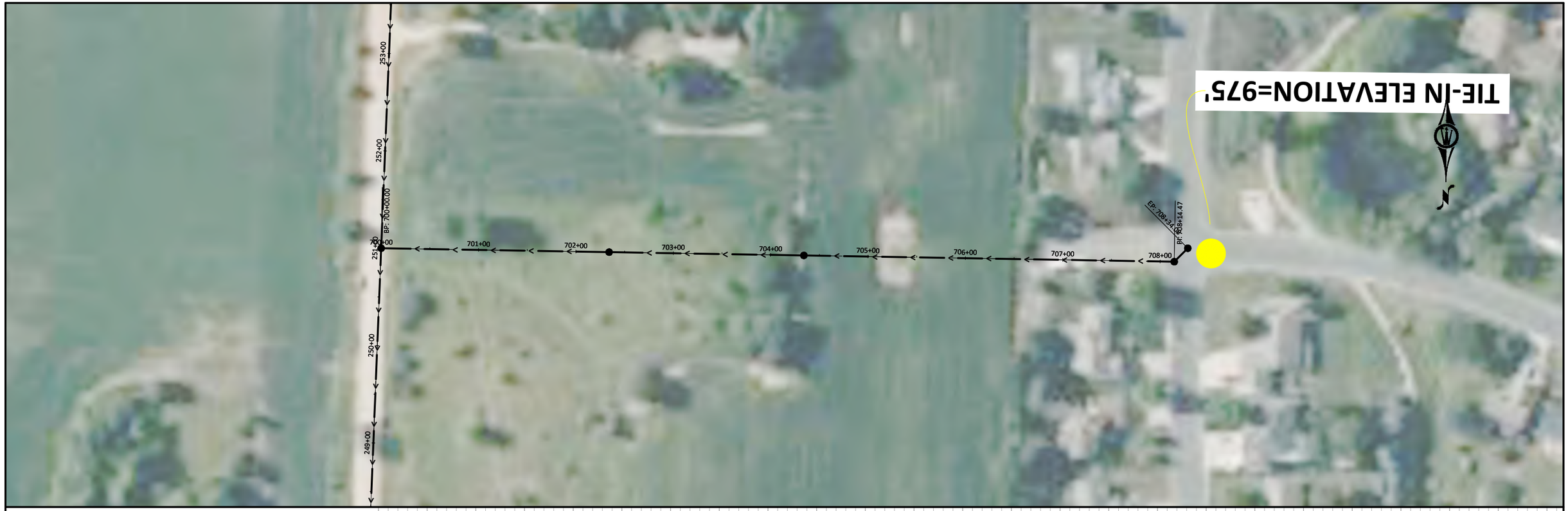
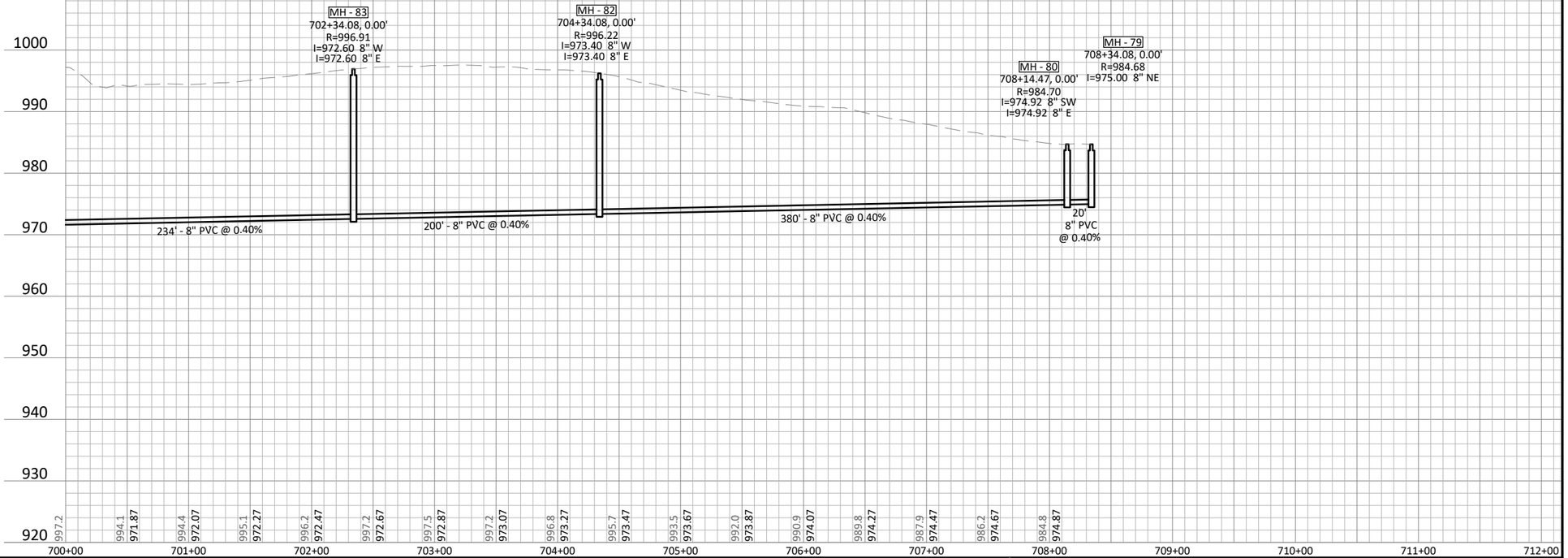
NELS - FM6 ALIGNMENT

SHEET
C4.84





HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 10 20 FEET

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NELS - S7 ALIGNMENT

SHEET
C4.85

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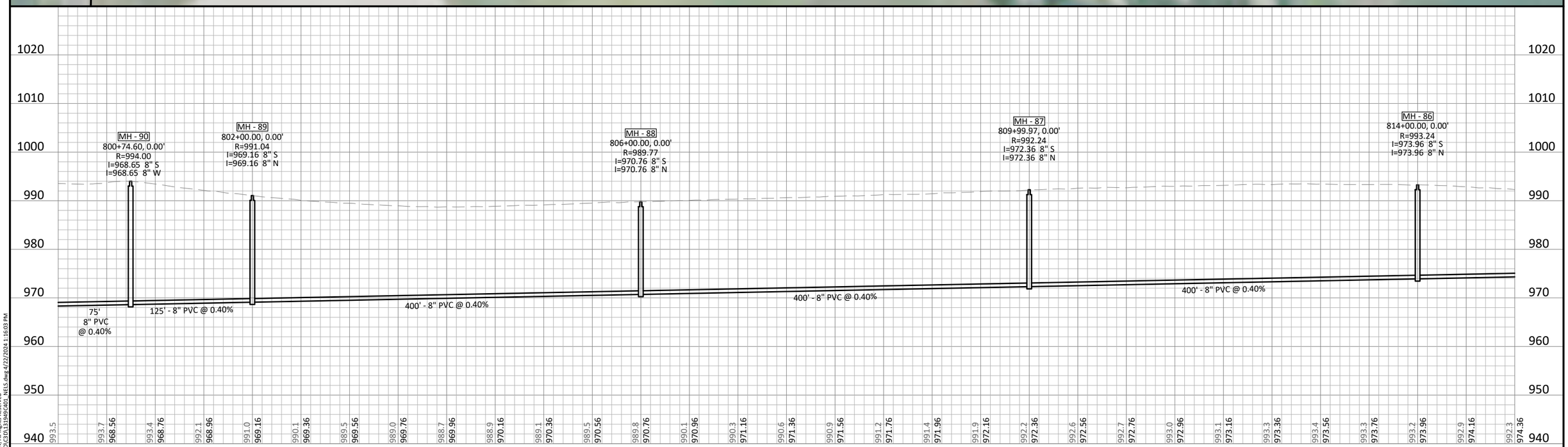

HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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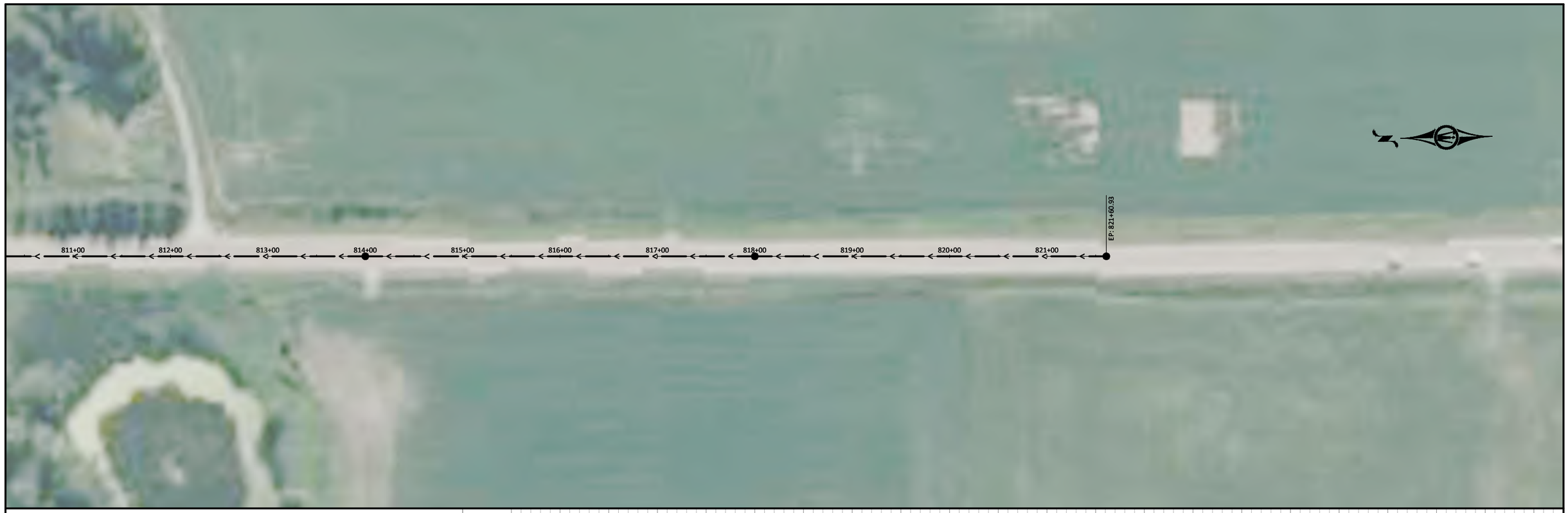
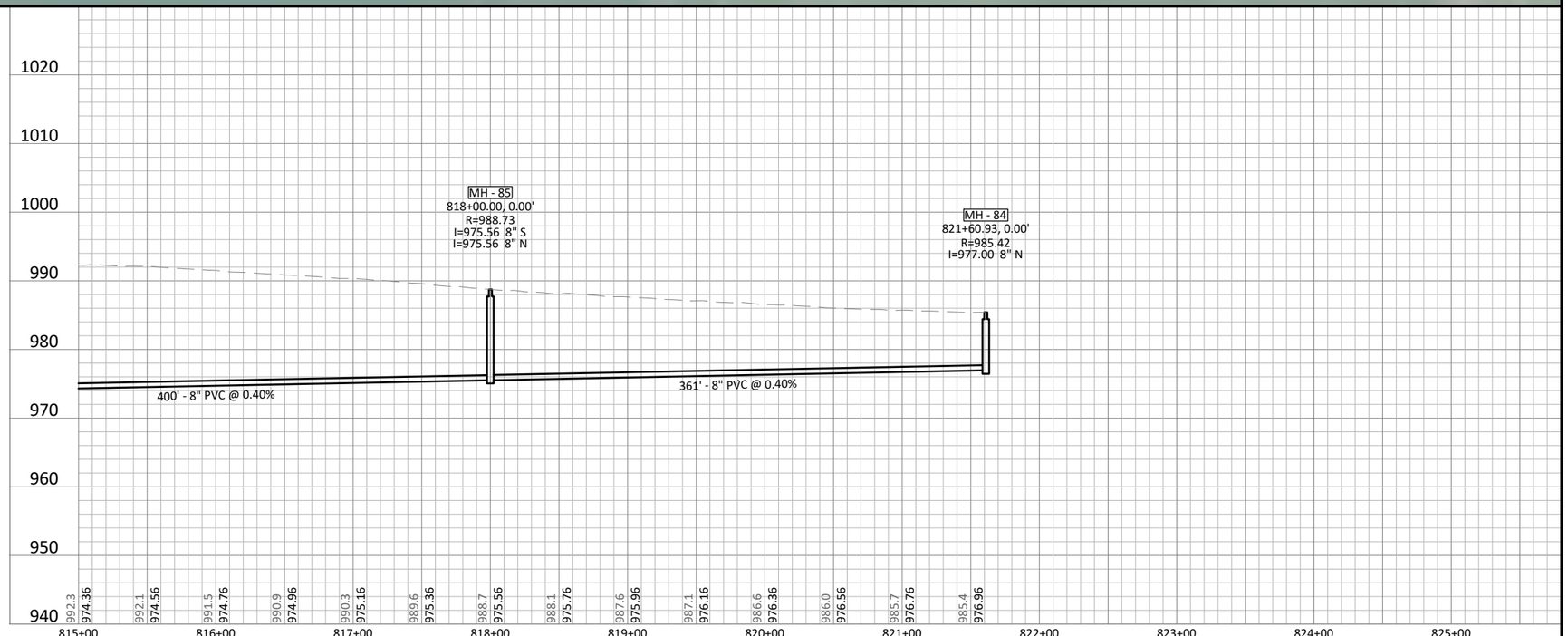
NELS - E8 ALIGNMENT

SHEET
C4.86





HORZ. SCALE 0 50 100 FEET
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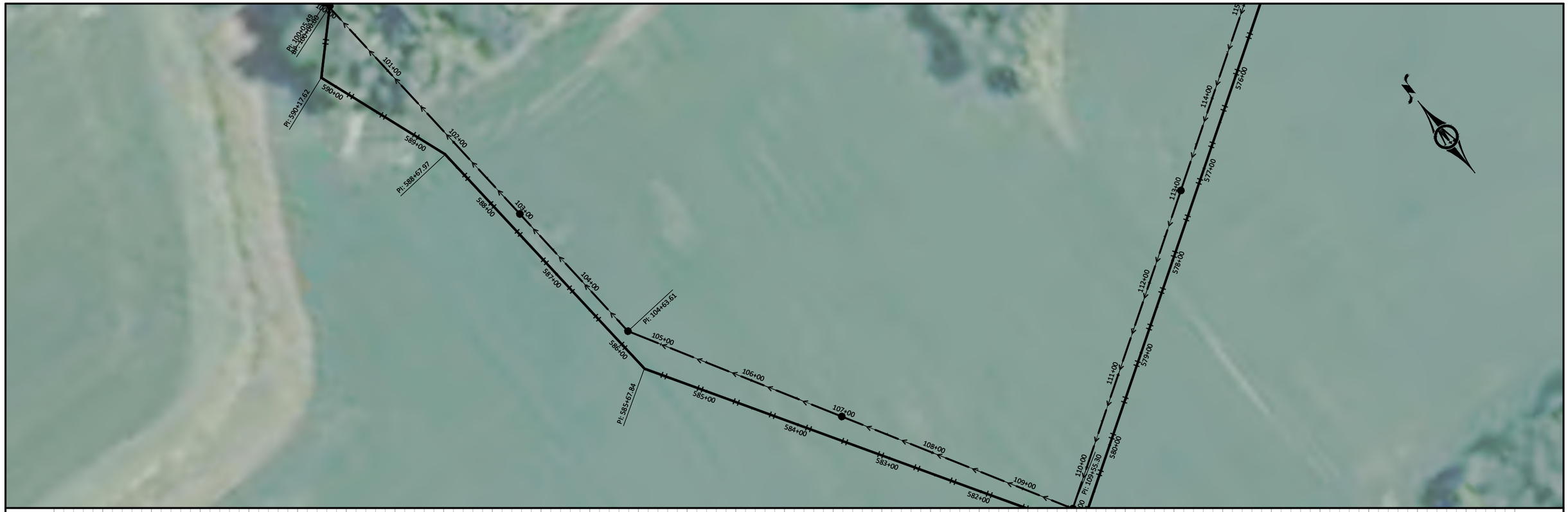
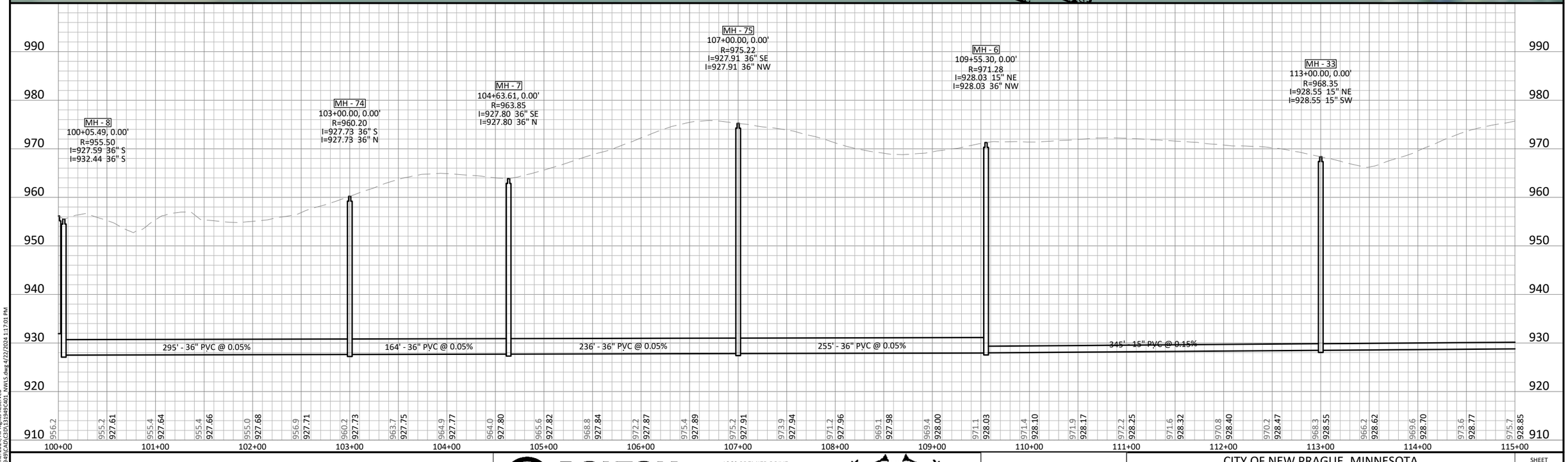
NELS - E8 ALIGNMENT

SHEET
C4.87





HORZ. 0 50 100 SCALE FEET

VERT. 0 10 20 SCALE FEET

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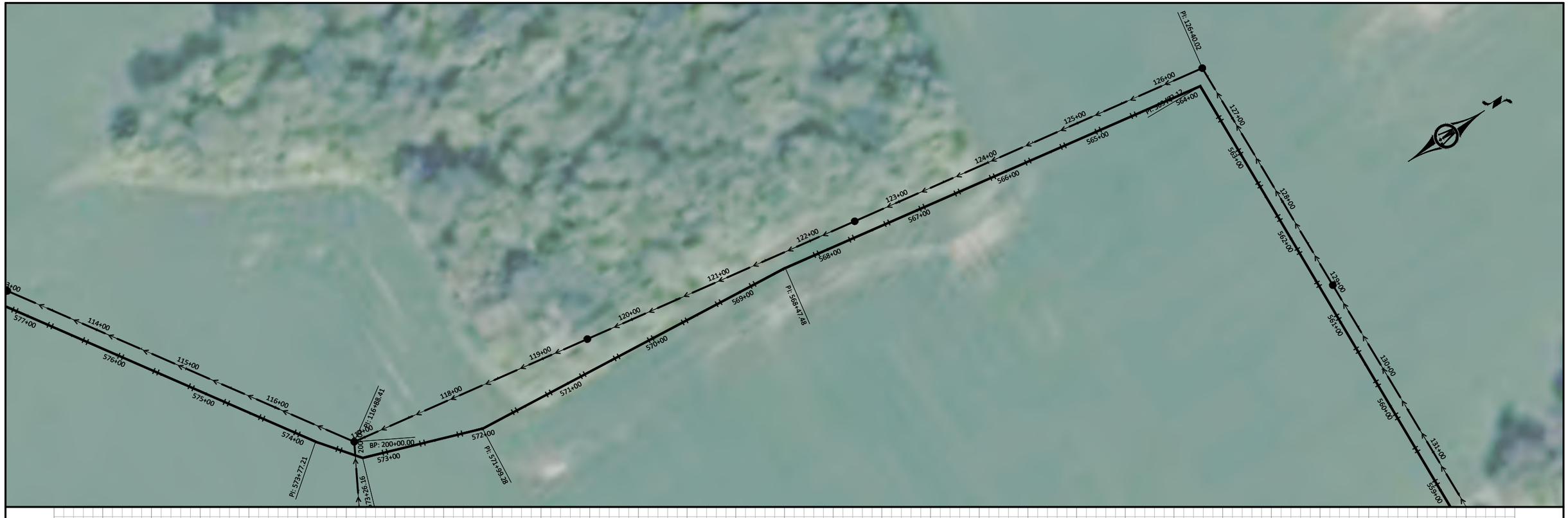

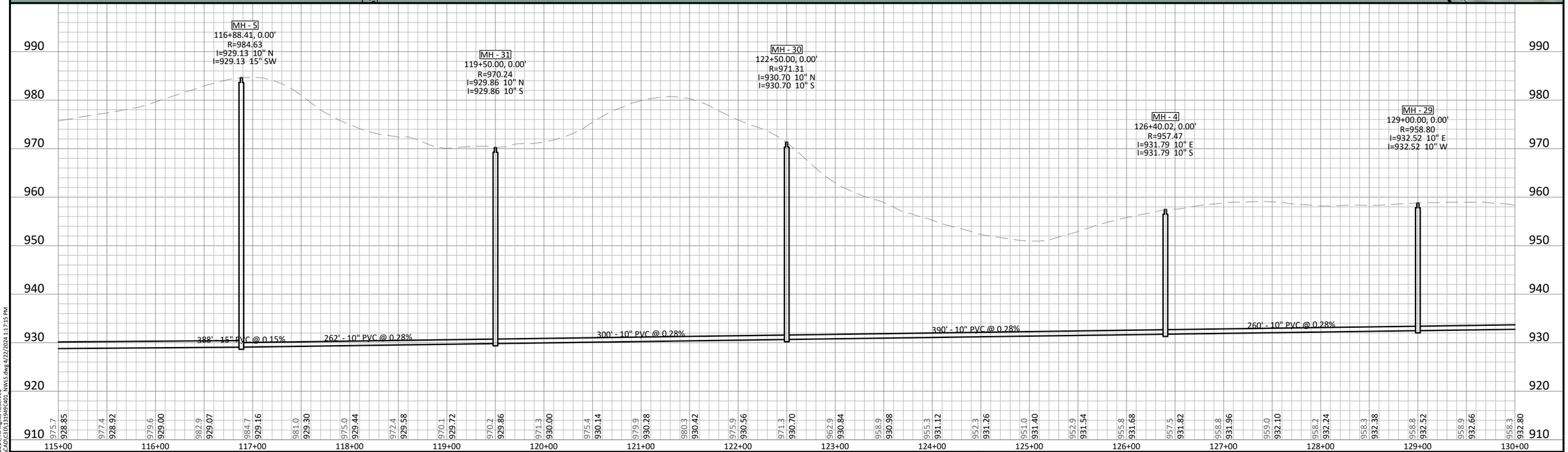

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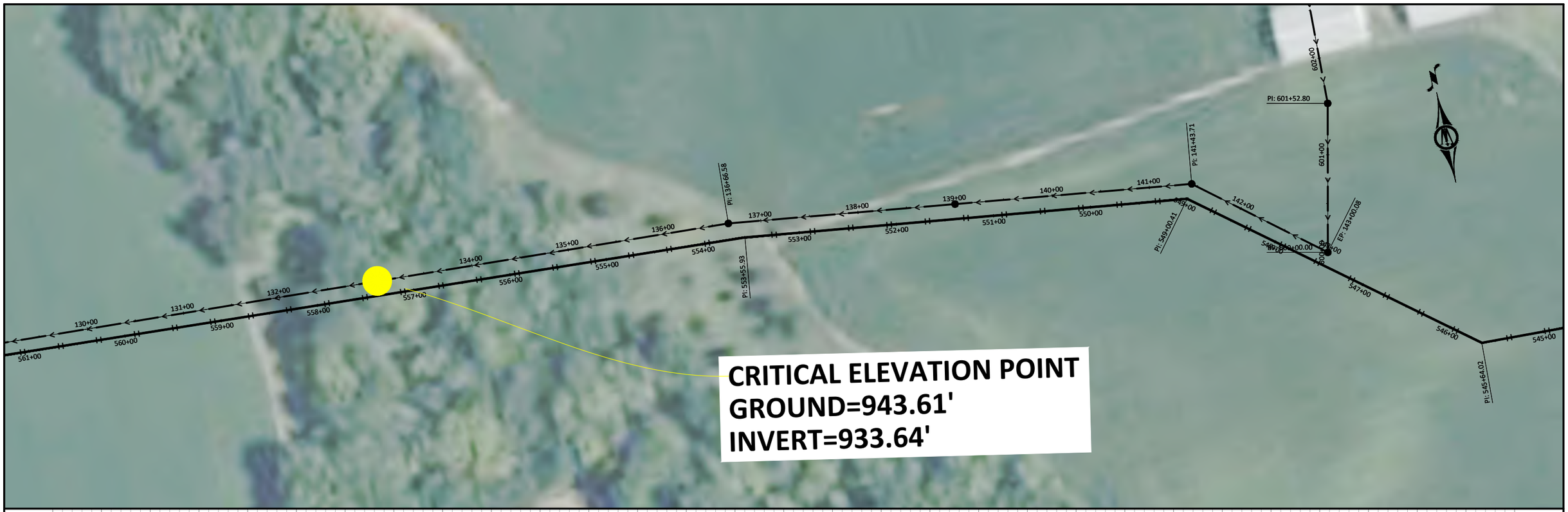

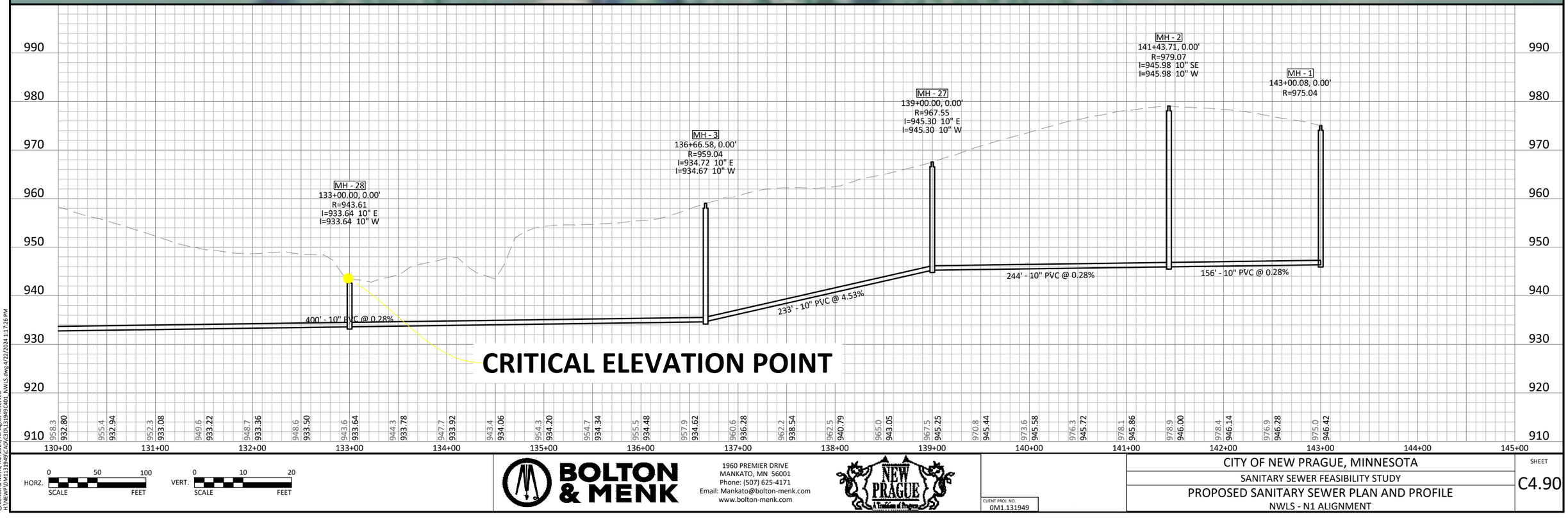

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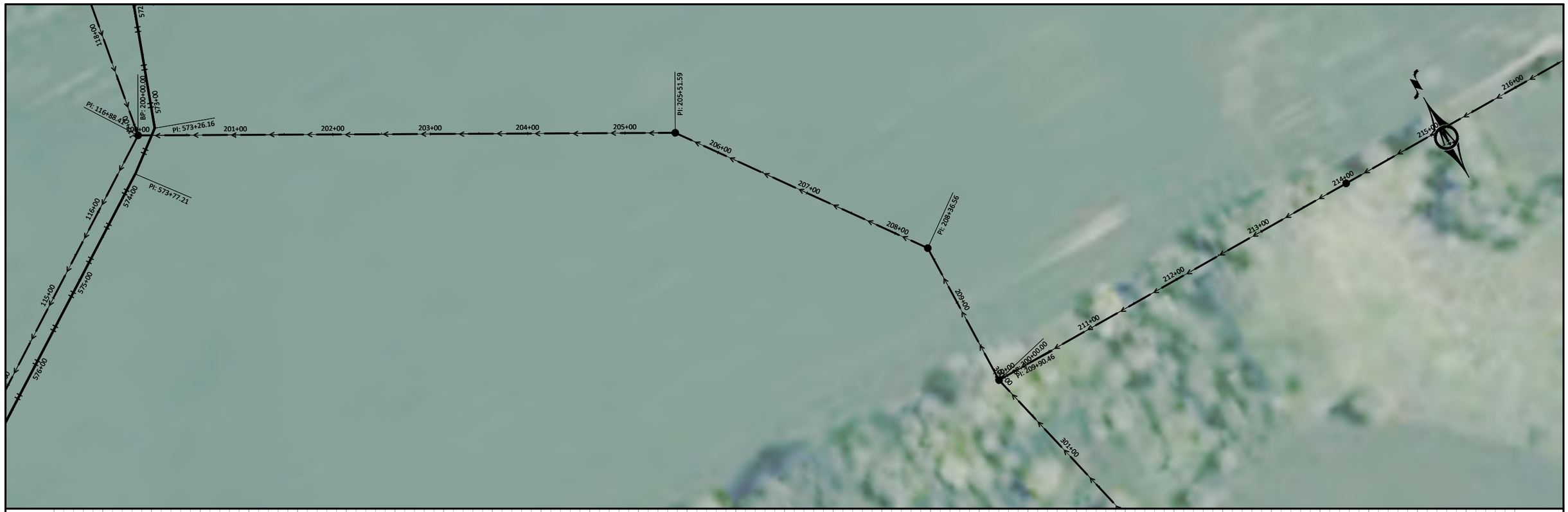

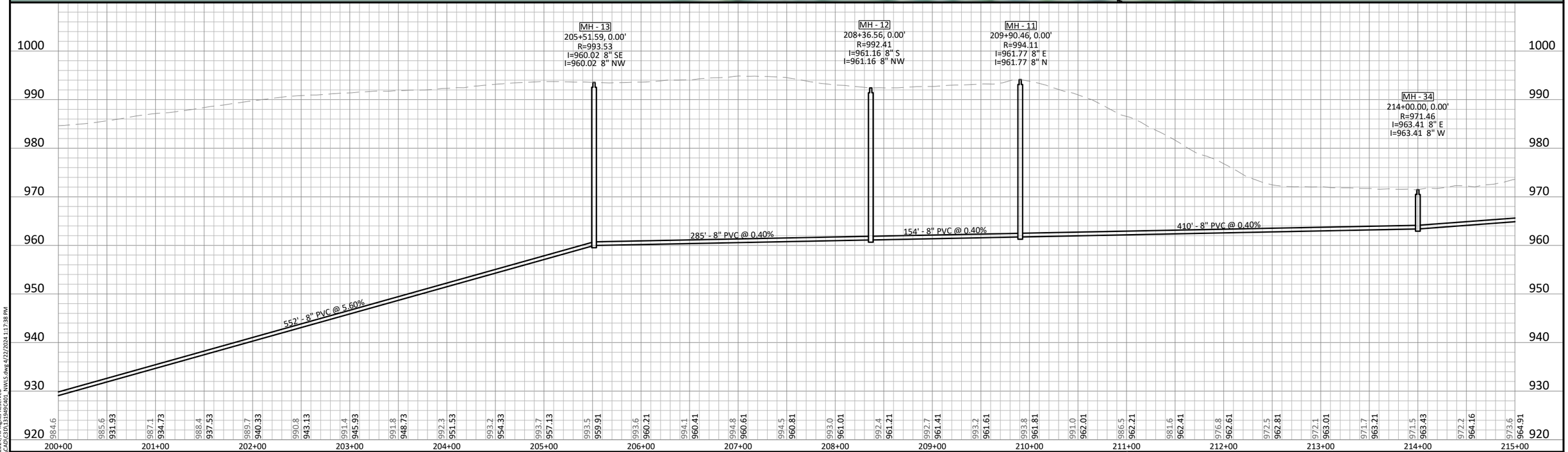

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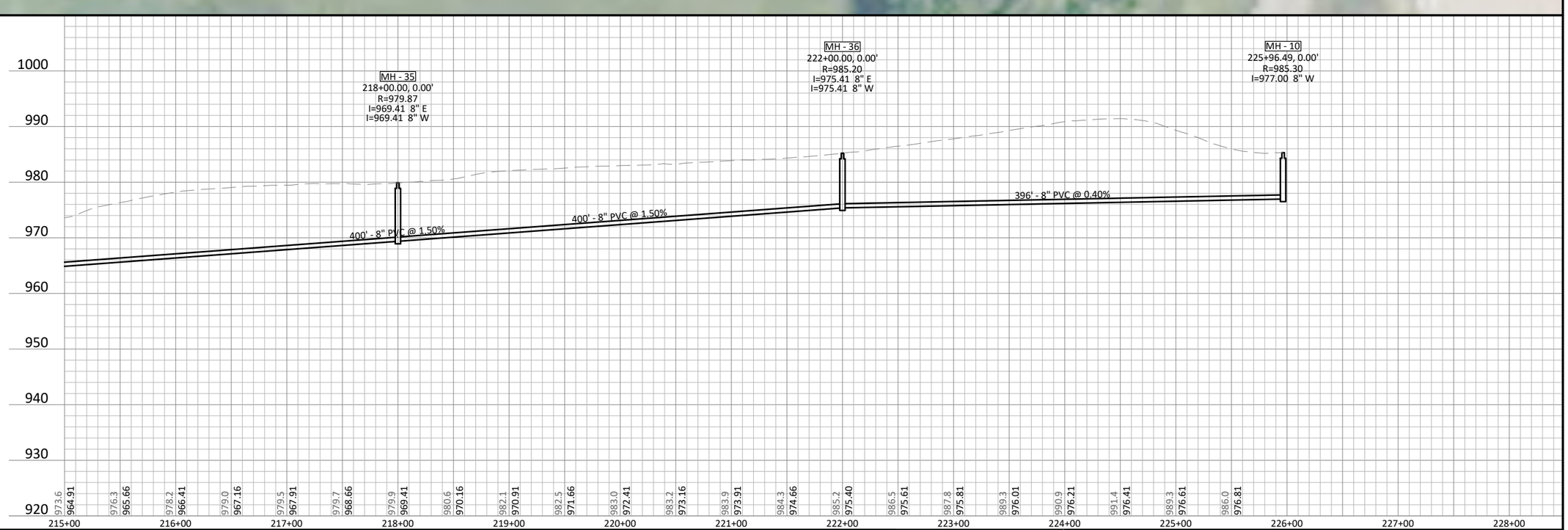

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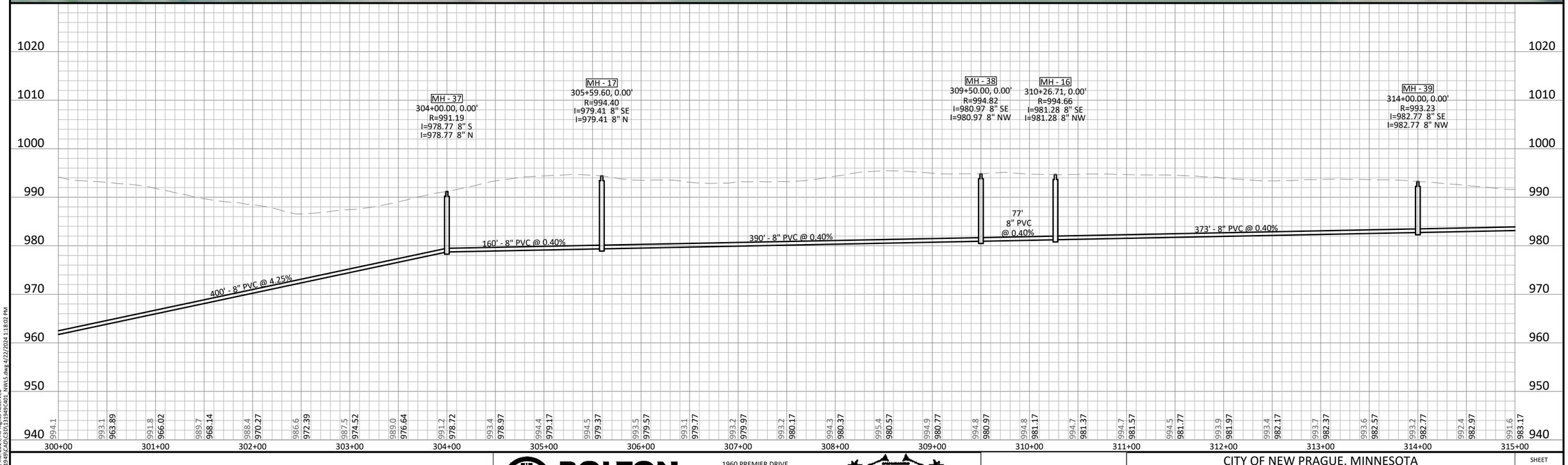

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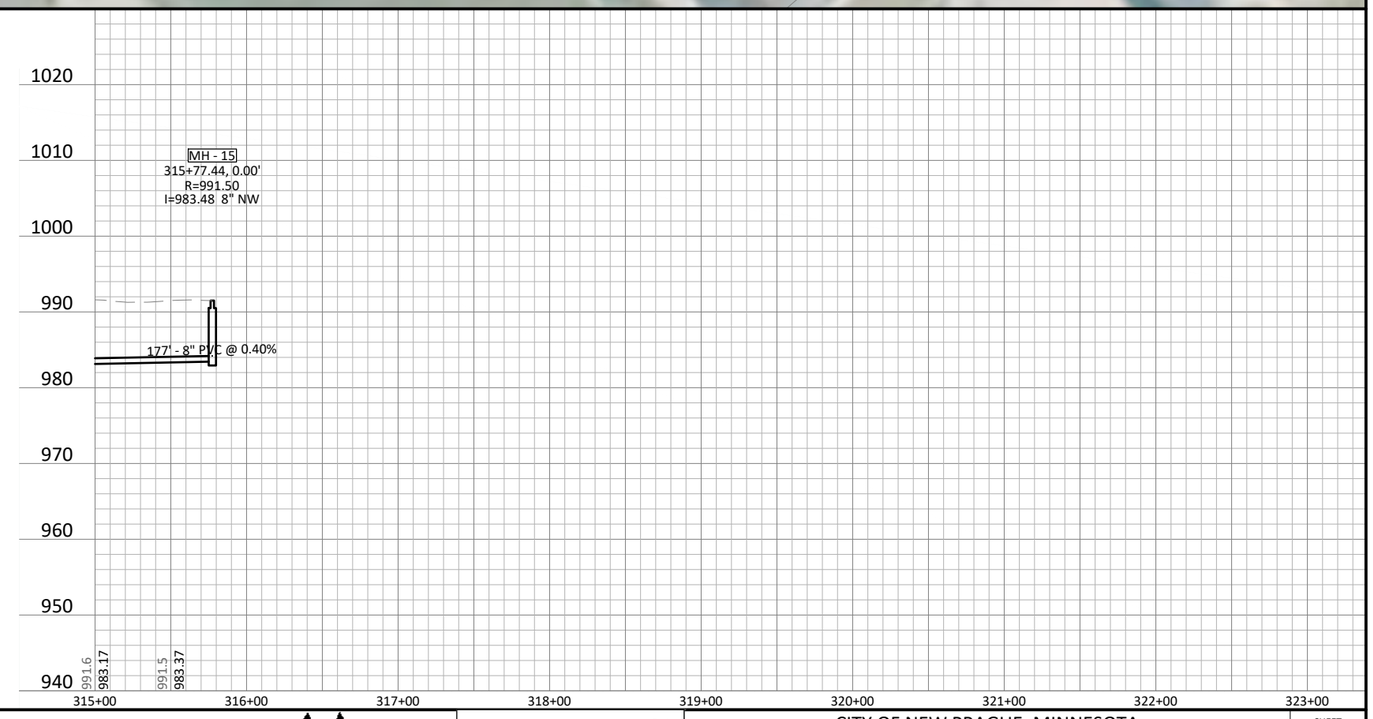

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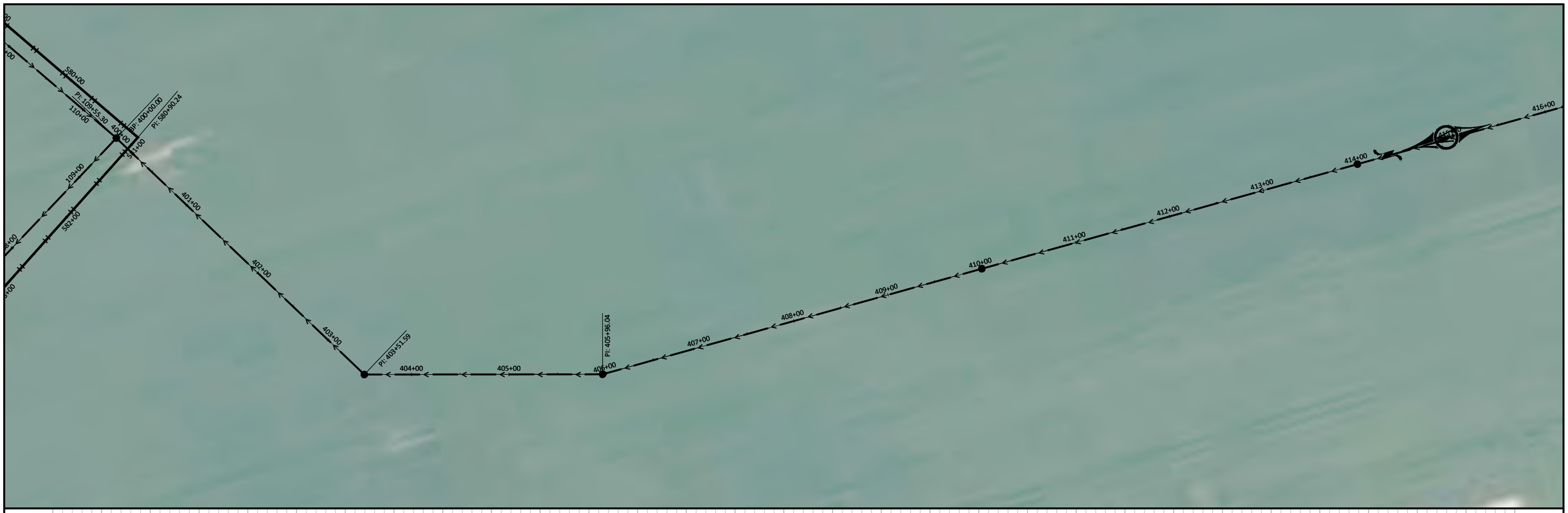

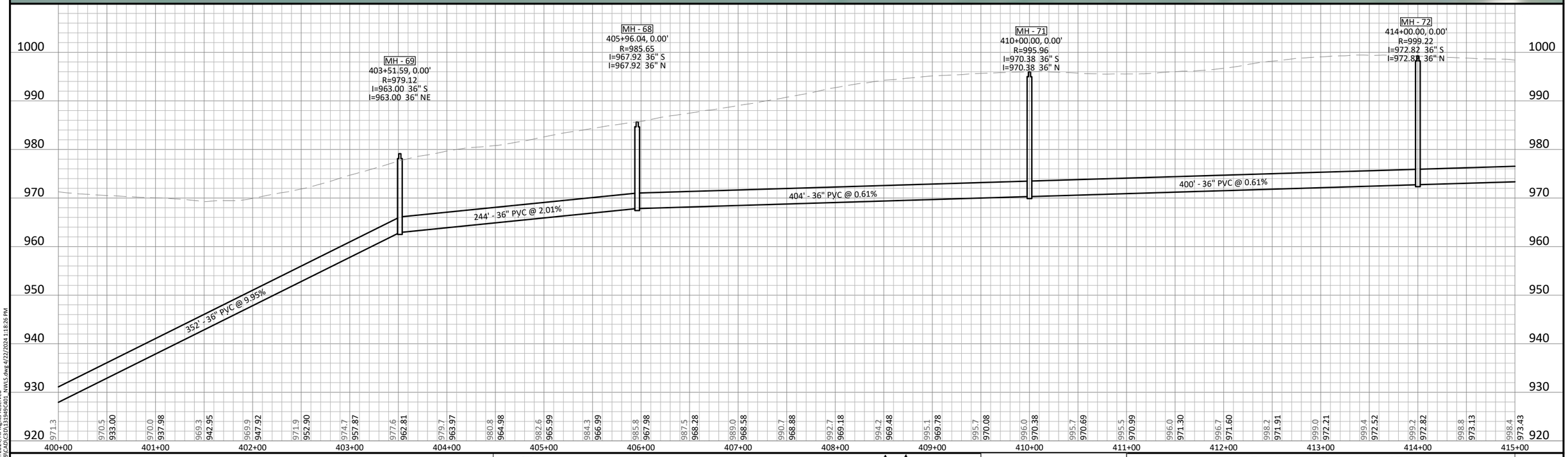

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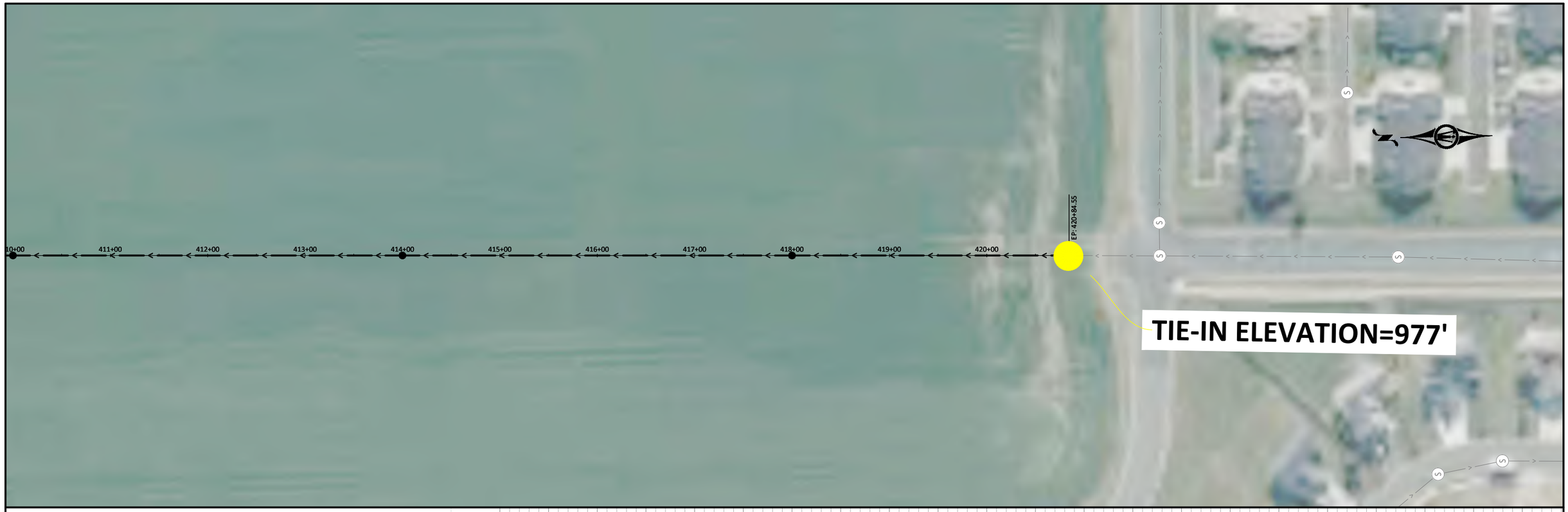

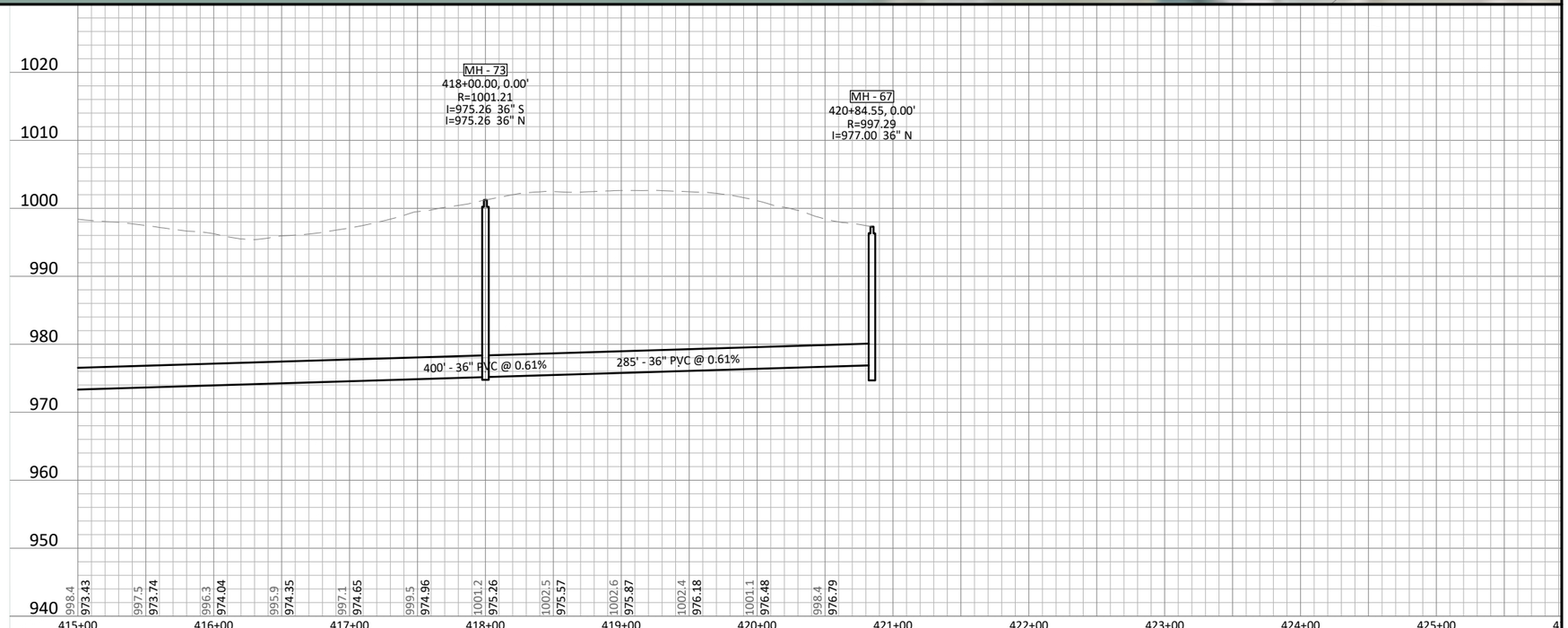

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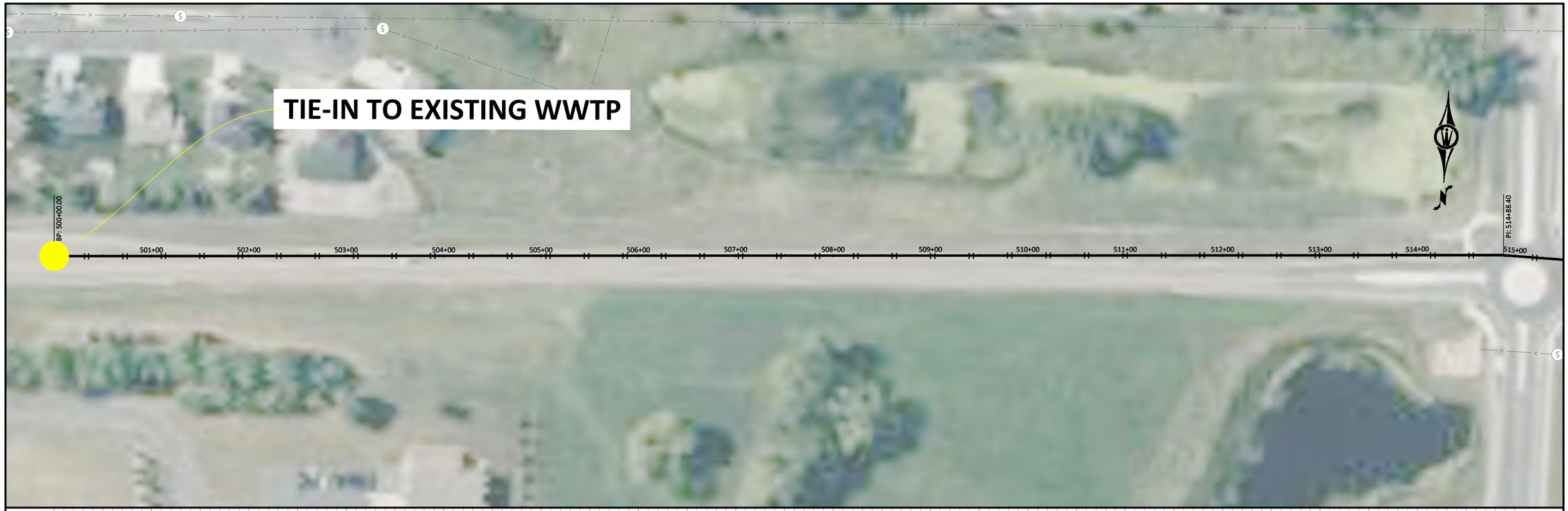

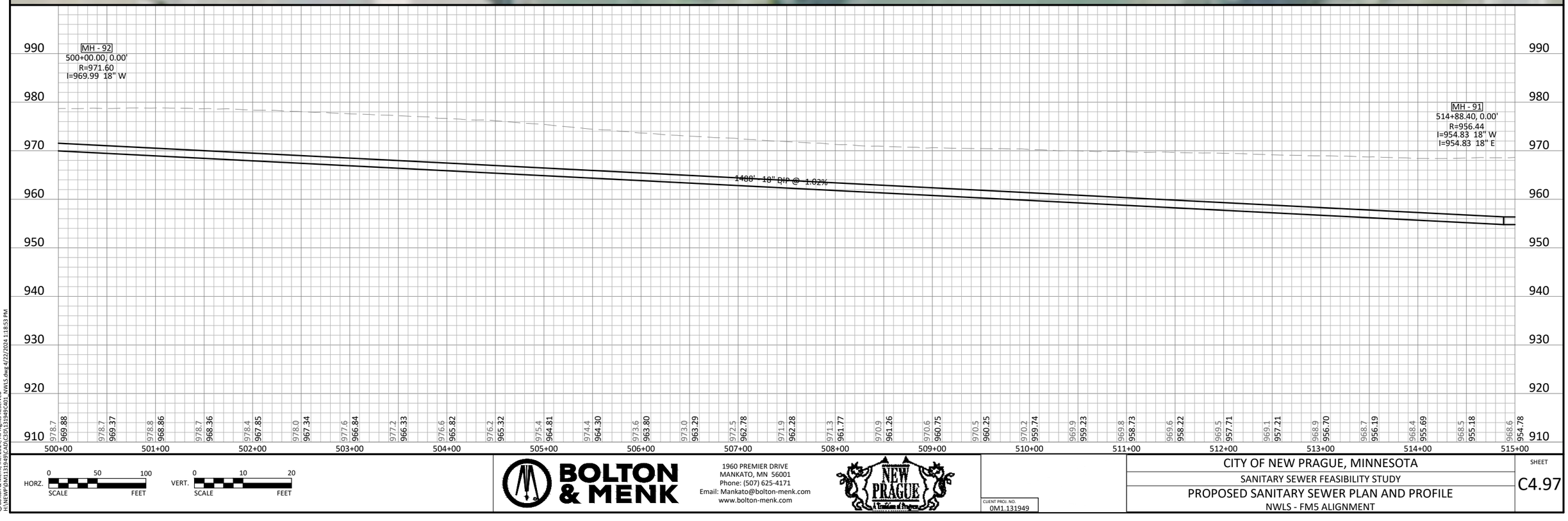

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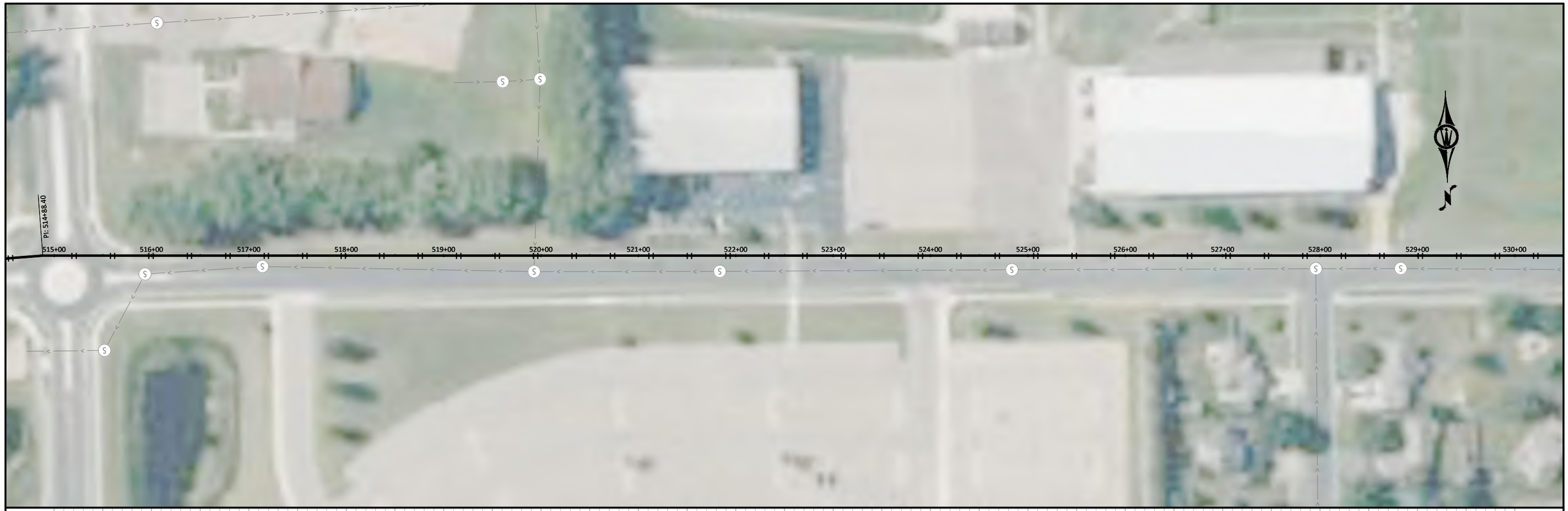

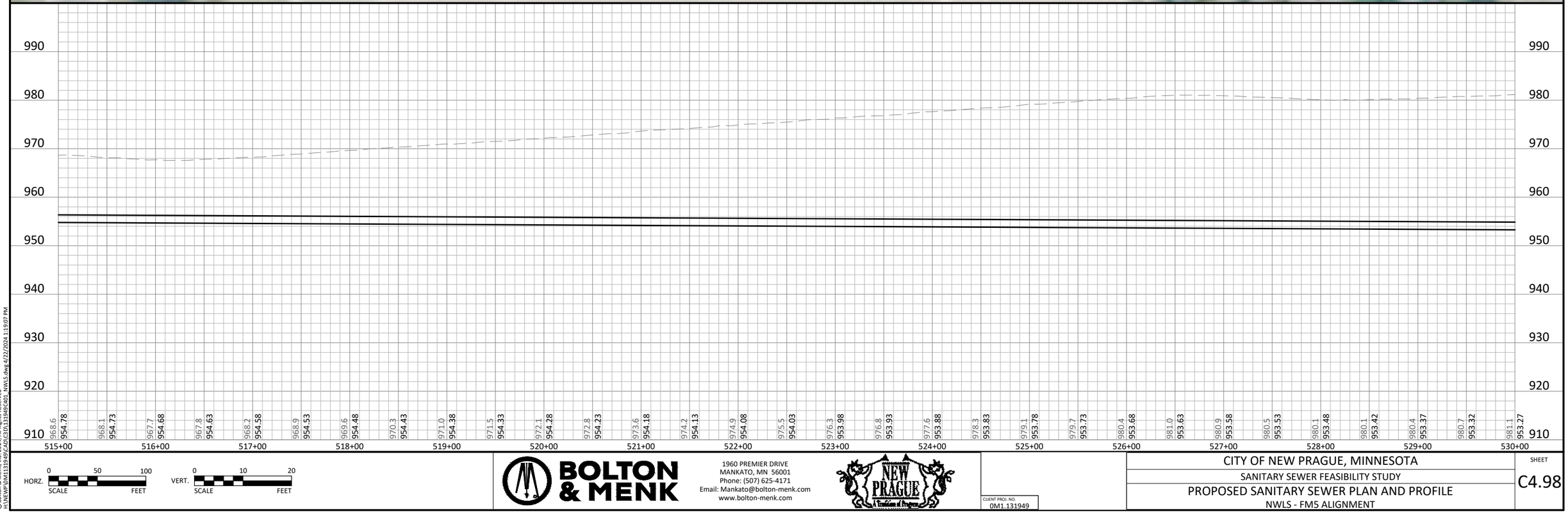

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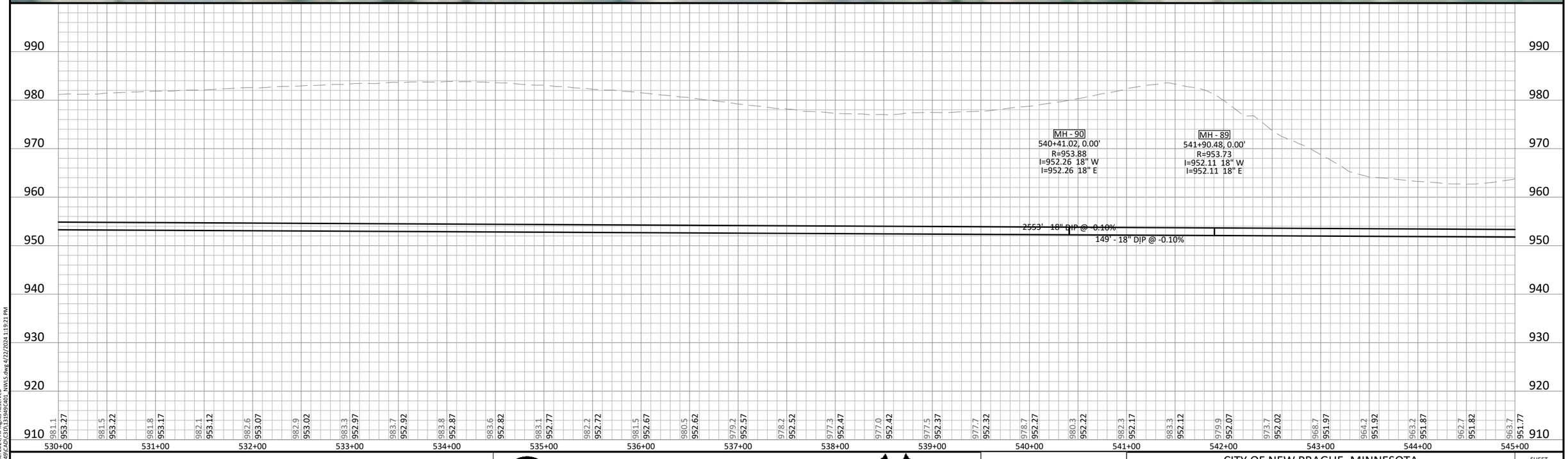

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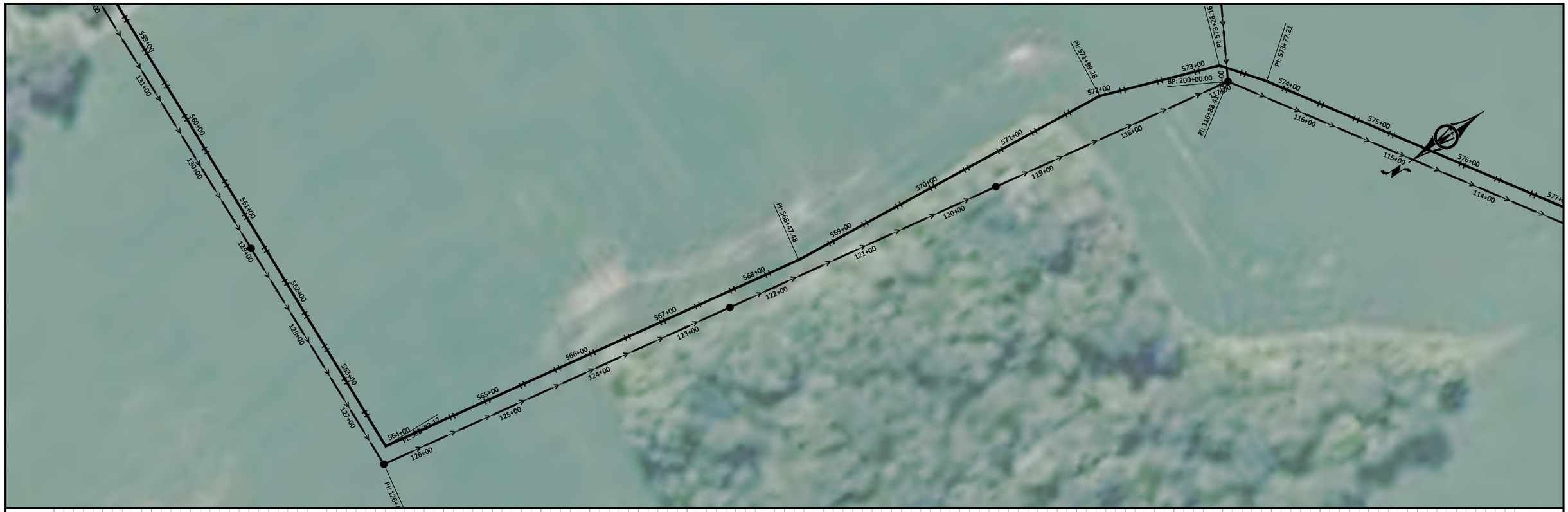

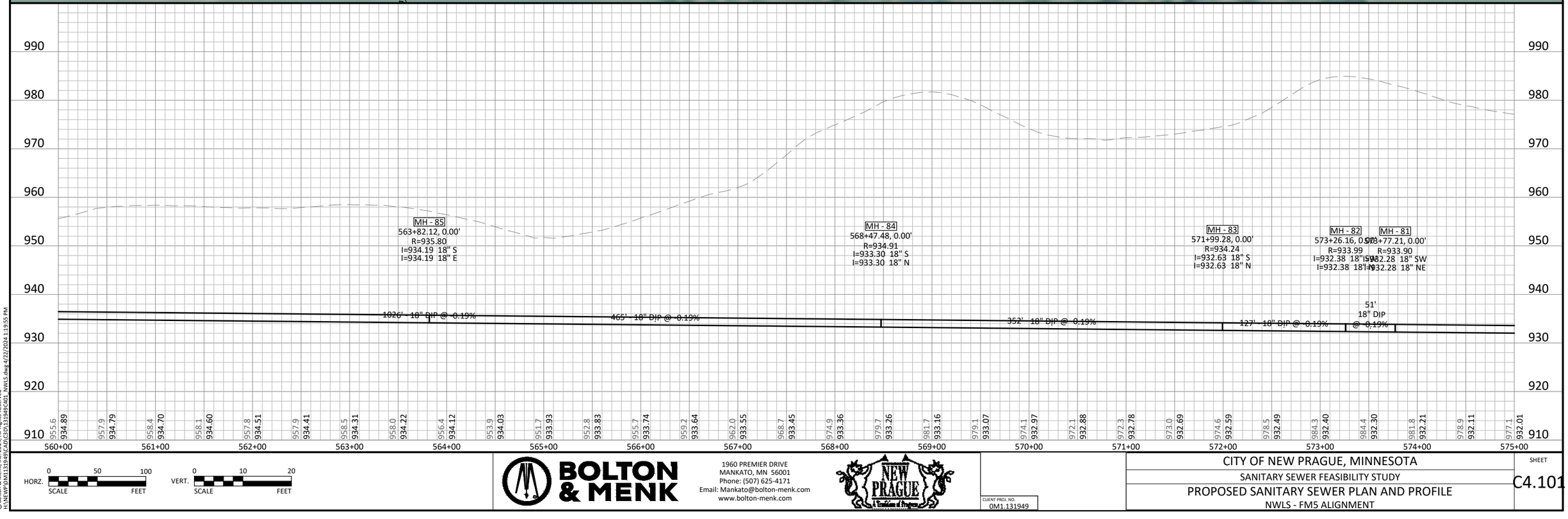

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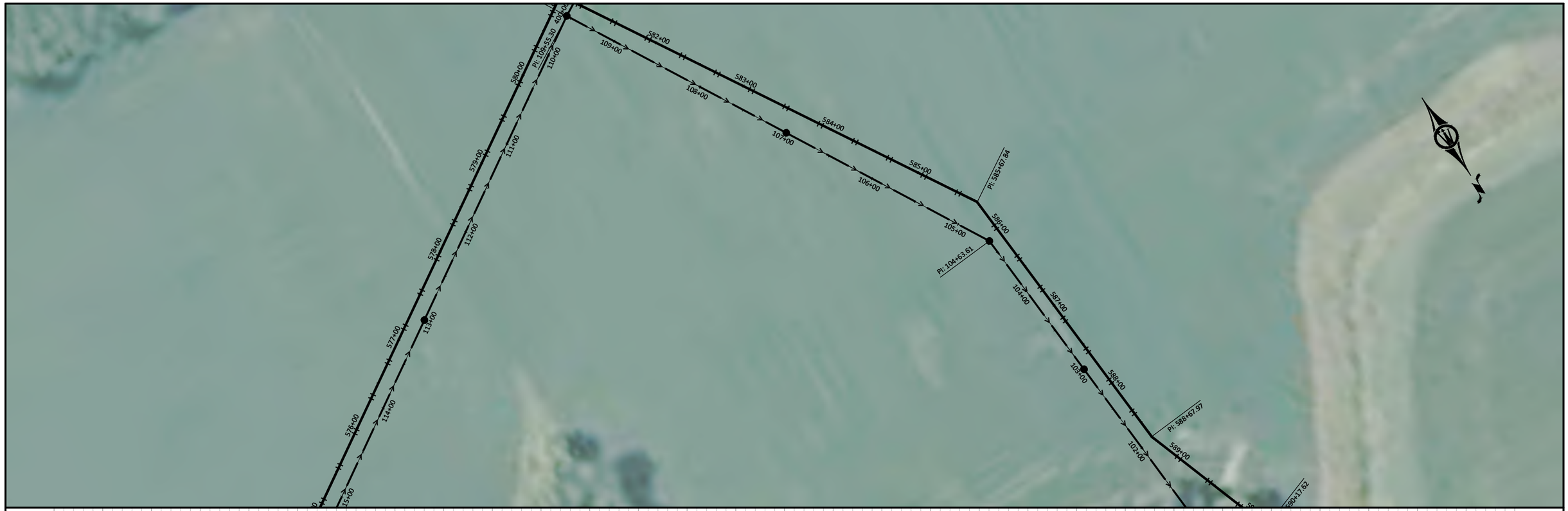

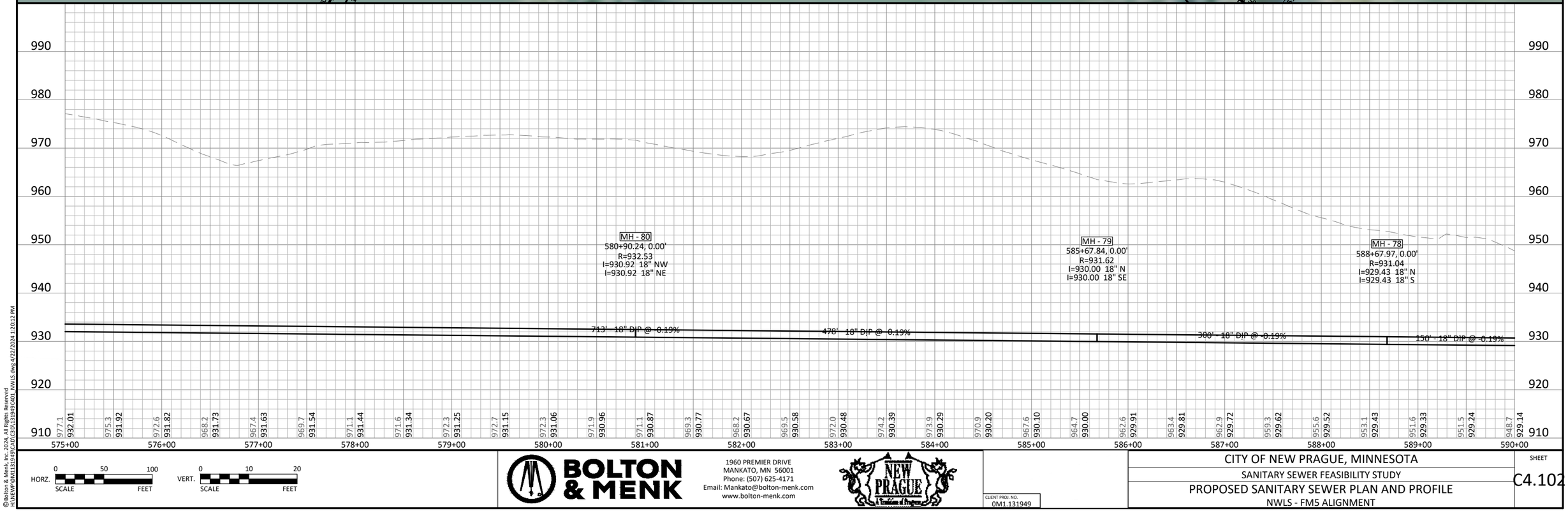

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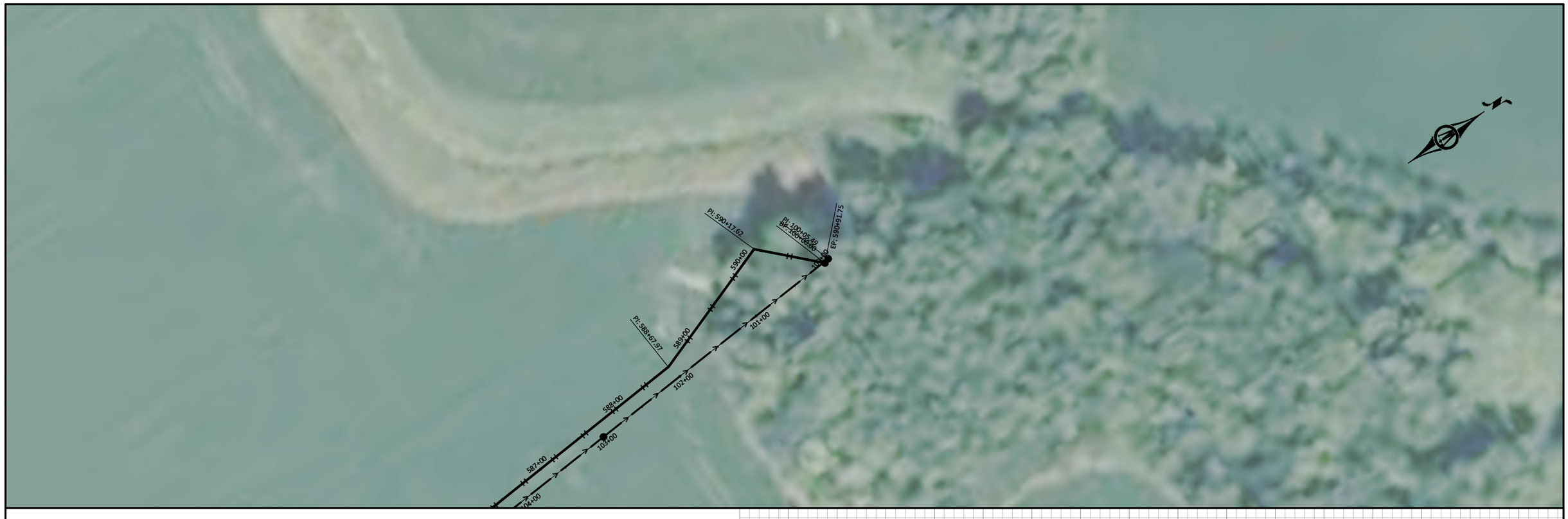

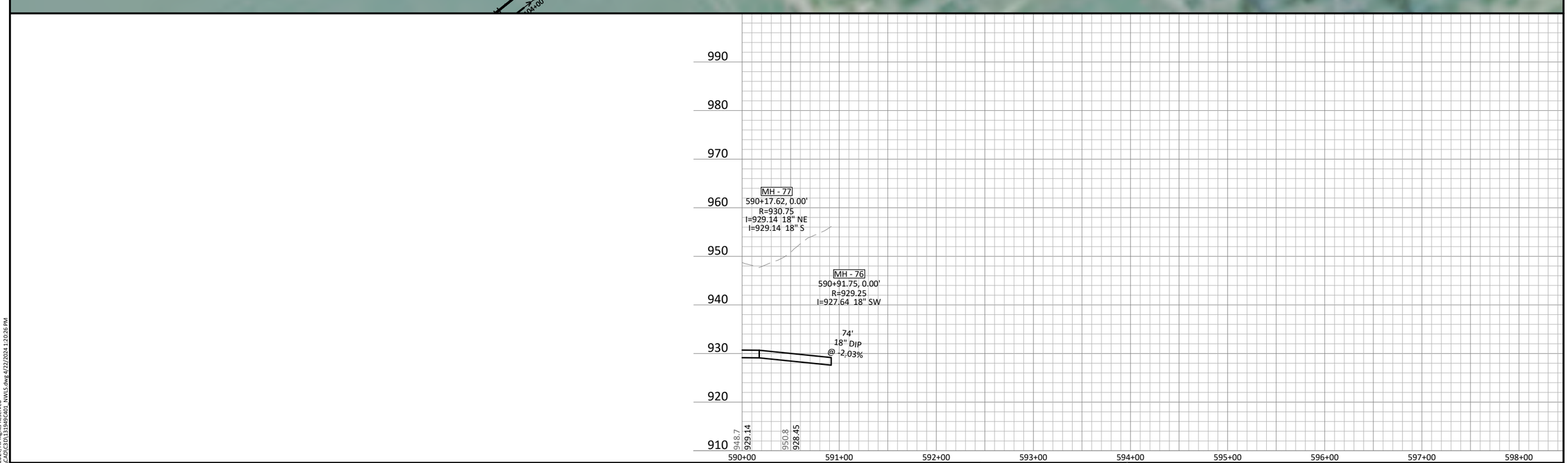

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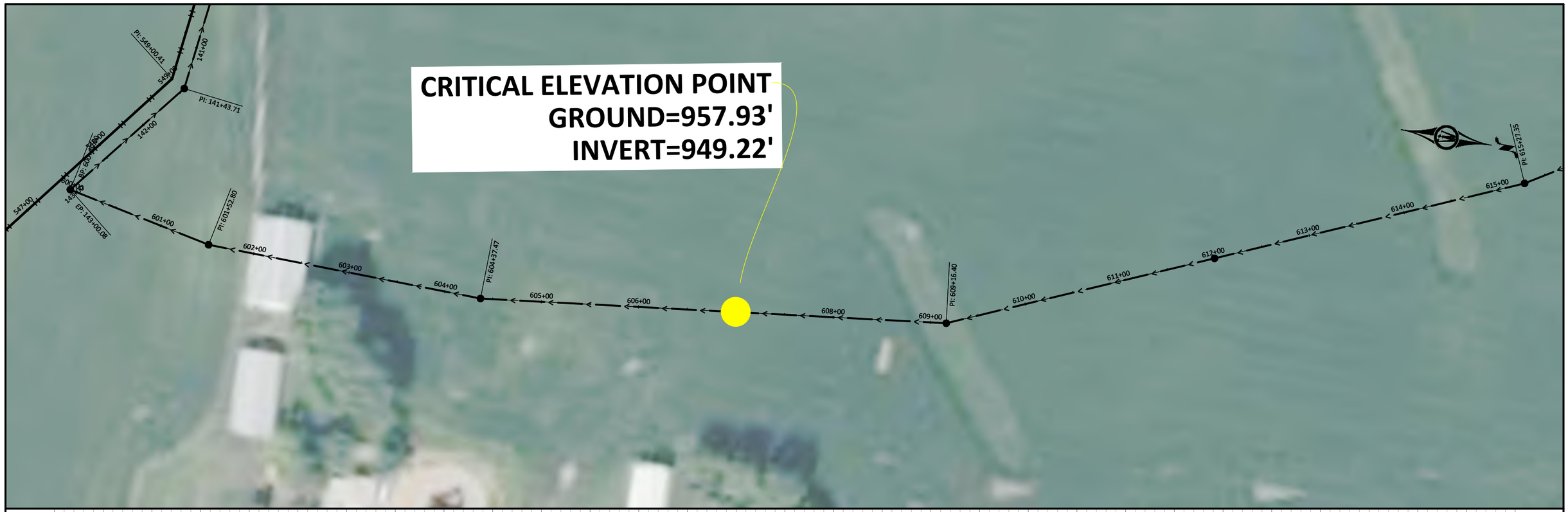

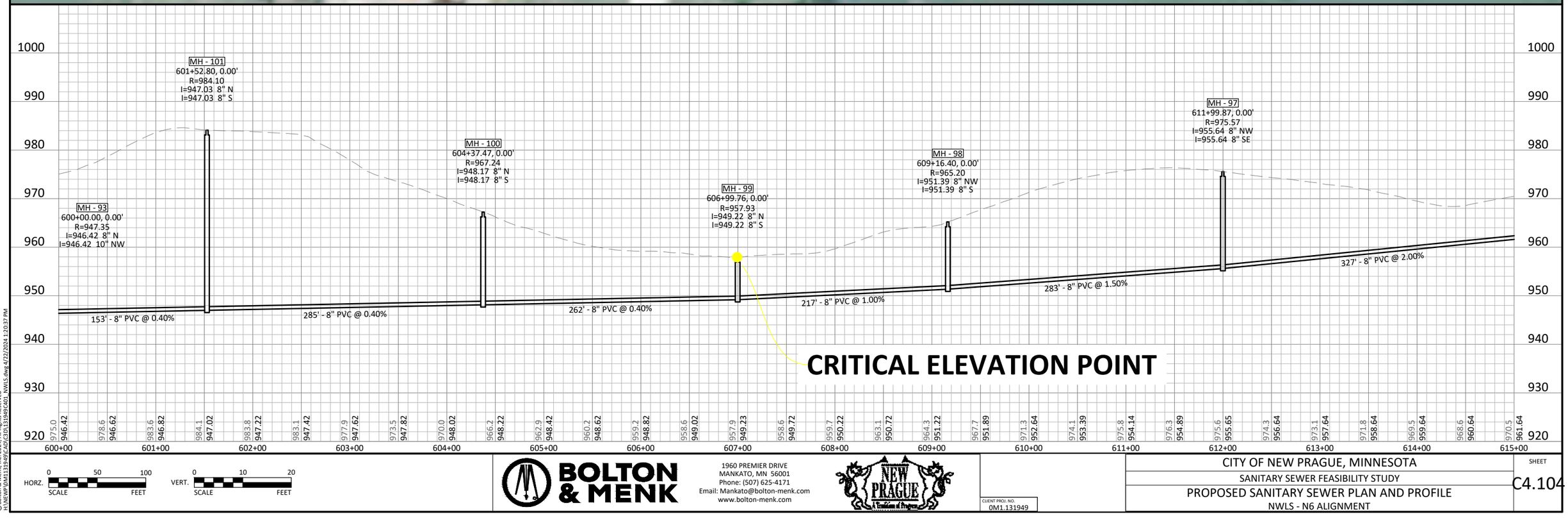

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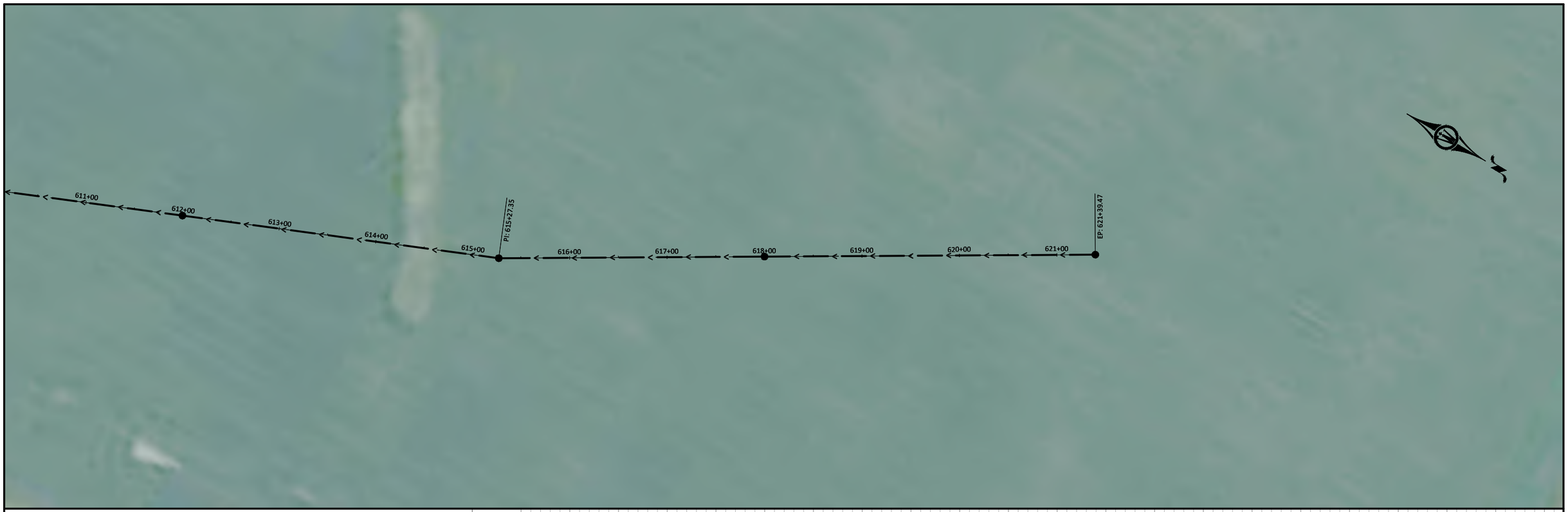

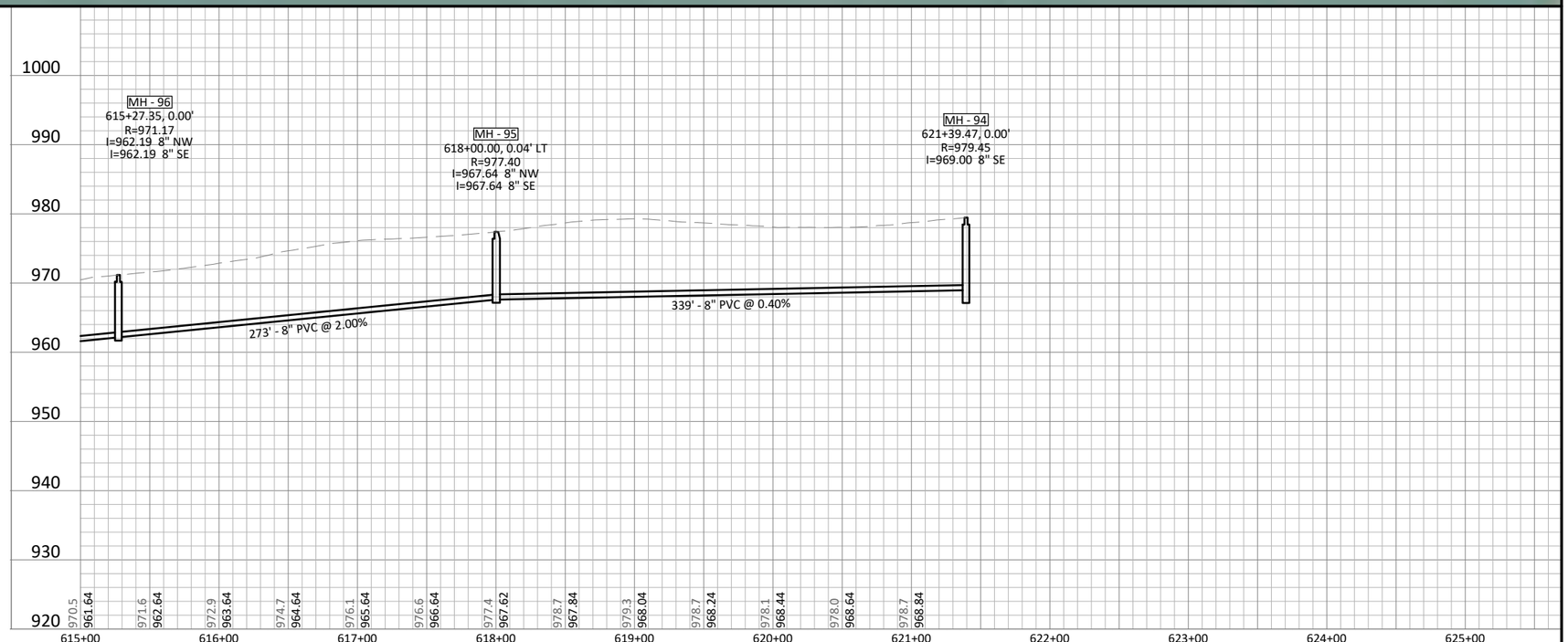

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Appendix D: Summary of Lift Station Sizing Calculations and Costs

New Prague Sanitary Sewer Lift Station Analysis
8/16/2024

Lift Station Area	Average Daily Flow (MGD)	Eq Population (thousands)	Peaking Factor	Peak Hourly Flow (MGD)	Peak Hourly Flow (GPM)	Forcemain Size (inches)	Forcemain Velocity (FPS)	Forcemain Length	Pump Settintg Elevation (FT)	Forcemain Discharge Elevation (FT)	Static Head (FT)	Velocity Head (FT)	TDH(FT)	No Pumps running at PHF	Estimated HP		
Southwest Lift Station	1.198	11.98	2.88	3.45	2393	10	9.78	3575	957	982	25	131.1	156	1	139	3.46121366	
South Lift Station	0.24	2.4	3.52	0.85	587	6	6.67	765	981	984	3	25.0	28	1	6	1.549193338	
Southeast Lift Station	0.622	6.22	3.16	1.96	1363	8	8.71	3935	979	987	8	150.7	159	1	91	2.493992783	
Northeast Lift Station	1.452	14.52	2.79	4.05	2816	12	7.99	2355	946	970	24	48.1	72	1	60	3.810511777	
North west Lift Station	2.401	24.01	2.57	6.18	4290	14	8.95	9100	922	970	48	191.4	239	2	182	4.9	151.6737581
Gravity -West	0.05	0.5	3.97	0.20	138											0.707106781	
Northwest Lift Station additional flow from current areas	0.419	4.19	3.32	1.39	965											2.046948949	

Lift Station Area	LS Pump Cap (GPM)	LS Pump HP	No of Pumps	LS Base Depth	LS Grade	LS Build Depth	LS Diameter FT)	Excavation Volume (CF)	Excavation Volume (CY)	r	R	Excavation Cost ($)	Hauling Cost ($)	Backfill Cost ($)	Erx + Backfill	Structure Cost ($)	Valve Vault Cost ($)	structue total
Southwest Lift Station	2393	139	2	954	992	38	10	83,086	3,077	5	43	$ 46,159.16	30,772.78	92,318.33	169,250.26	$ 189,562.96	$ 63,187.65	$ 252,750.62
South Lift Station	587	6	2	978	995	17	8	9,626	357	4	21	$ 5,347.89	3,565.26	10,695.77	19,608.91	$ 89,315.56	$ 29,771.85	$ 119,087.41
Southeast Lift Station	1363	91	2	976	1015	39	10	89,028	3,297	5	44	$ 49,460.23	32,973.49	98,920.47	181,354.19	$ 193,051.85	$ 64,350.62	$ 257,402.47
Northeast Lift Station	2816	60	2	943	980	37	10	77,415	2,867	5	42	$ 43,008.11	28,672.08	86,016.23	157,696.42	$ 186,074.07	$ 62,024.69	$ 248,098.77
North west Lift Station	4290	182	3	919	955	36	12	77,319	2,864	6	42	$ 42,955.20	28,636.80	85,910.40	157,502.40	$ 225,149.63	$ 75,049.88	$ 300,199.51
												15	10	30		2000		

New Prague Sanitary Sewer Study
Summary of Lift Station Cost

	Lift Station Area				
Item	**Southwest Lift Station**	**South Lift Station**	**Southeast Lift Station**	**Northeast Lift Station**	**North west Lift Station**
Mobilization (5%)	$ 39,100	$ 20,435	$ 38,938	$ 38,290	$ 48,385
Allowance (10%)	$ 78,200	$ 40,870	$ 77,876	$ 76,580	$ 96,770
Driveway	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
Excavation and Backfill	$ 169,250	$ 19,609	$ 181,354	$ 157,696	$ 157,502
Wet Well/dry Well Structure	$ 252,751	$ 119,087	$ 257,402	$ 248,099	$ 300,200
Piping,Valves	$ 60,000	$ 40,000	$ 50,000	$ 80,000	$ 100,000
Pumps	$ 100,000	$ 60,000	$ 100,000	$ 90,000	$ 180,000
Control and Power	$ 100,000	$ 80,000	$ 90,000	$ 100,000	$ 120,000
Generator	$ 70,000	$ 60,000	$ 70,000	$ 60,000	$ 80,000
Sitework	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
Construction Subtotal	$ 899,301	$ 470,001	$ 895,570	$ 880,664	$ 1,112,857
Contingency (20%)	$ 179,860	$ 94,000	$ 179,114	$ 176,133	$ 222,571
Construction Total	$ 1,079,161	$ 564,001	$ 1,074,684	$ 1,056,797	$ 1,335,429