

# City of Portsmouth, New Hampshire

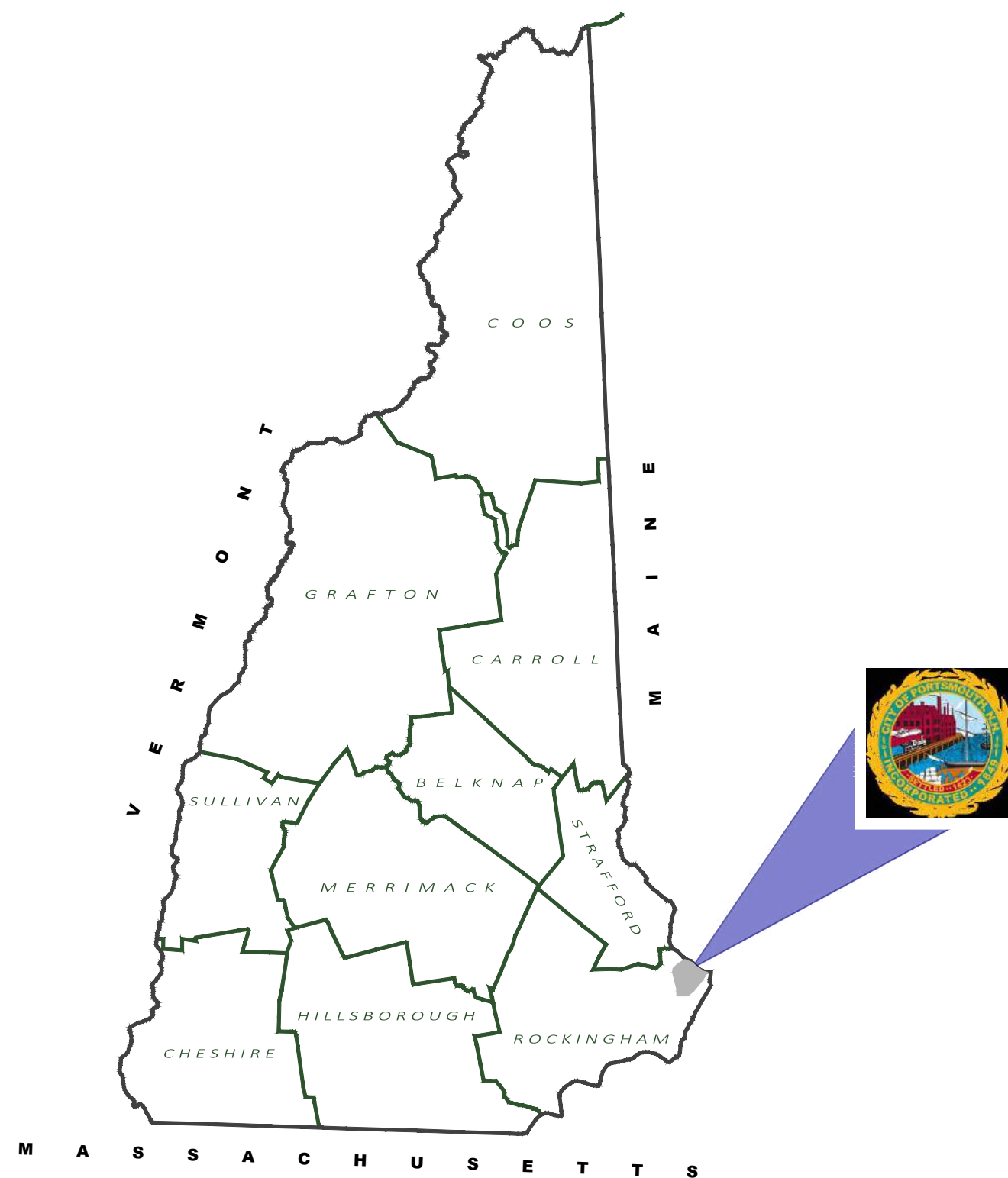
## Department of Public Works

### Willard Avenue Area Improvement Project

**Issued for Bid**  
**February 2024**

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- 22-29. Utility Plan and Profile
- 30. Base Bid Configuration
- 31-36. Detail Sheets
- 37-55. Cross Sections

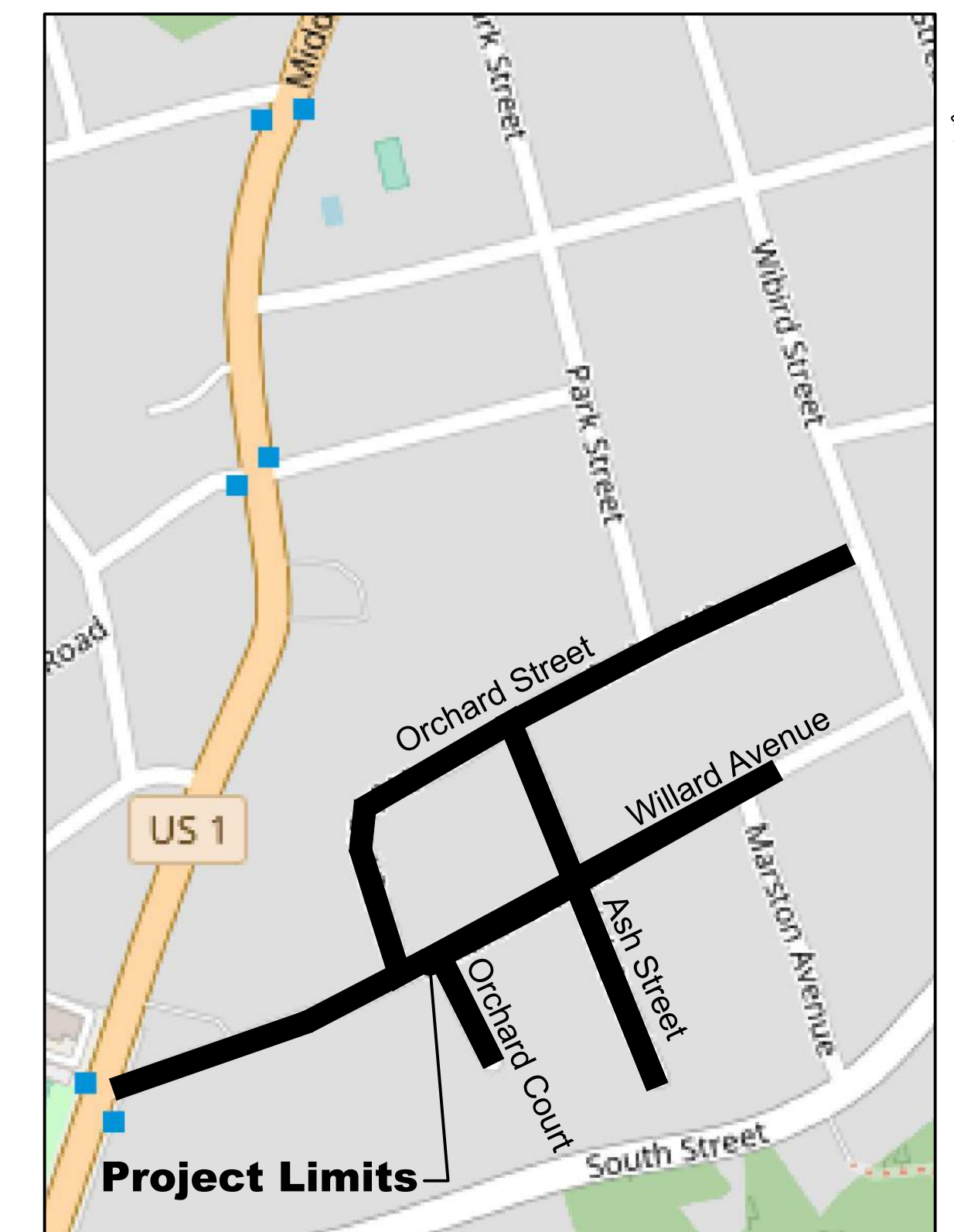


**Locus Plan**

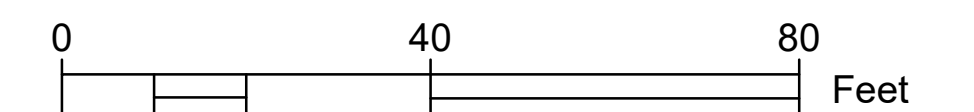
Prepared For:  
**City of Portsmouth**  
**Department of Public Works**  
**680 Peverly Hill Road**  
**Portsmouth, NH 03801**

Prepared By:  
**CMA**  
**ENGINEERS**

CIVIL/ENVIRONMENTAL/STRUCTURAL  
 Portsmouth, NH • Manchester, NH • Portland, ME  
 603/431-6196 • 603/627-0708 • 207/541-4223  
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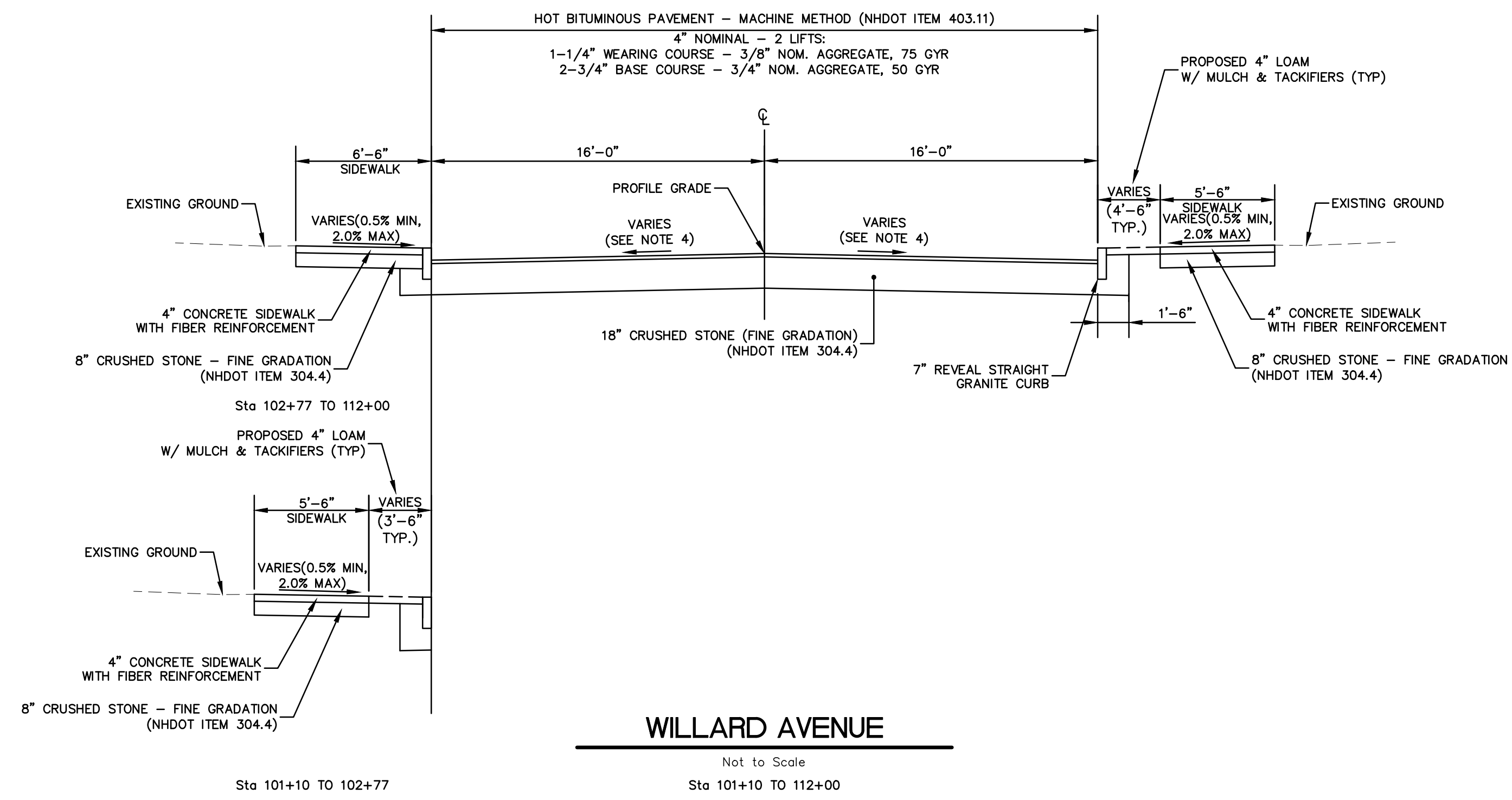
**Project Location**





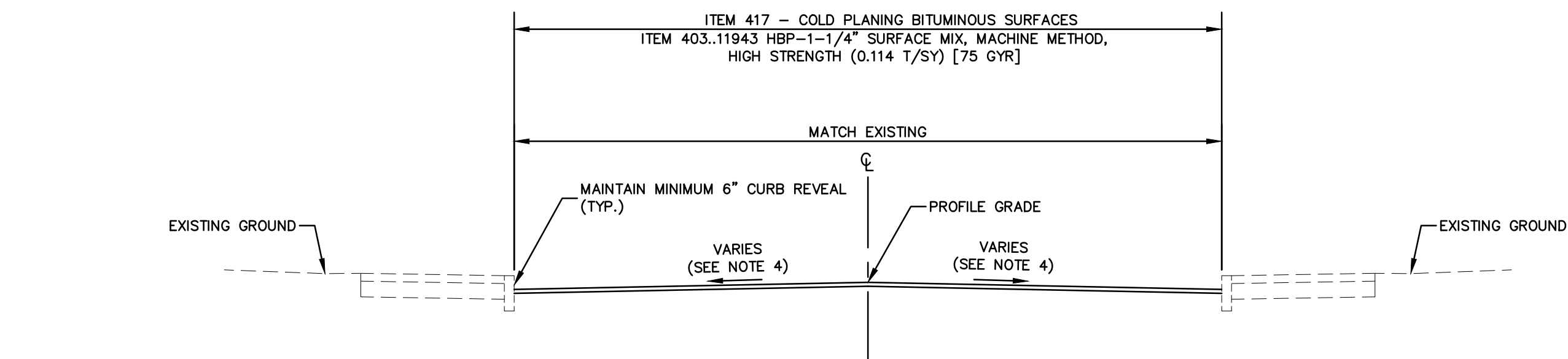






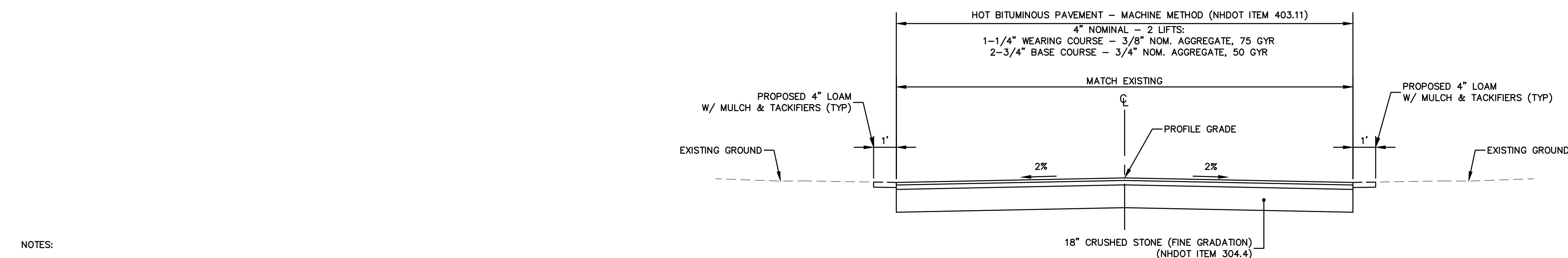
**WILLARD AVENUE**

Not to Scale  
Sta 101+10 TO 112+00



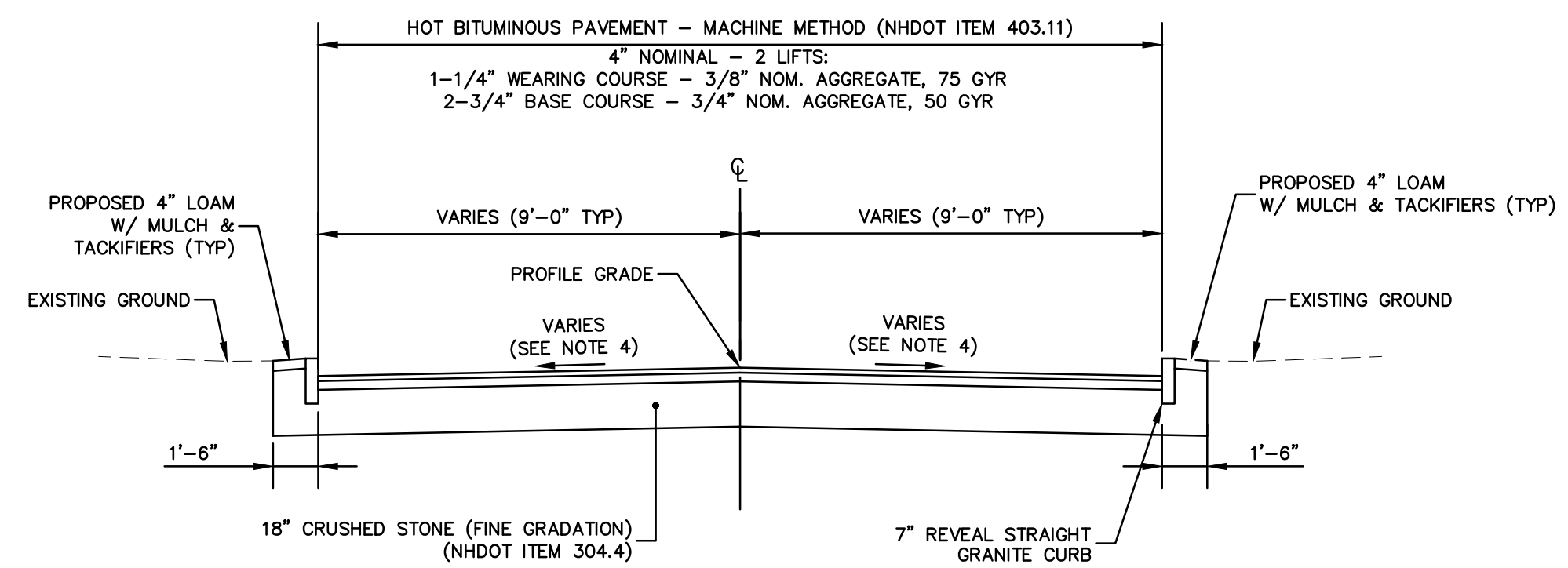
**ASH STREET SOUTH**

Not to Scale  
Sta 400+00 TO 403+40



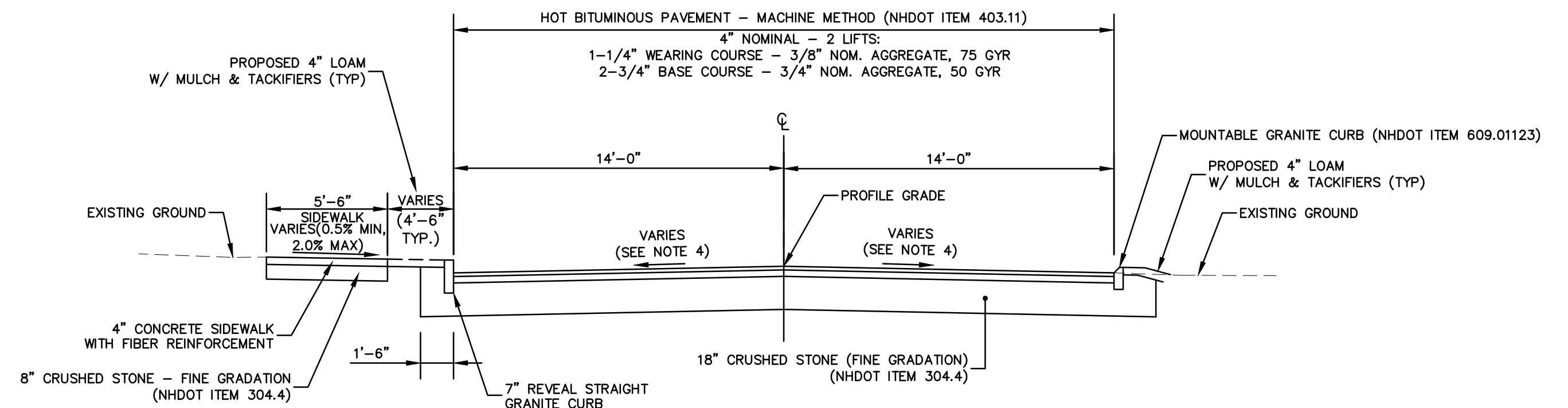
**ORCHARD COURT**

Not to Scale  
Sta 300+13 TO 301+73



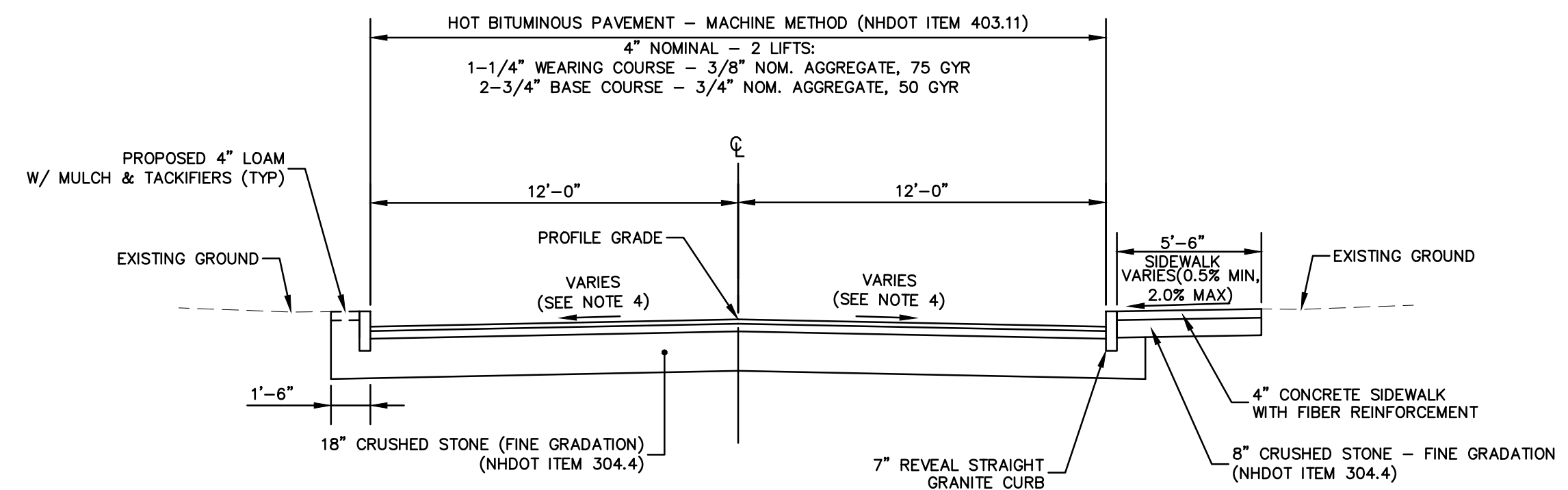
**ORCHARD STREET**

Not to Scale  
Sta 200+33 TO 206+20



**ORCHARD STREET**

Not to Scale  
Sta 206+20 TO 211+97



**ASH STREET NORTH**

Not to Scale  
Sta 403+80 TO 406+20

**NOTES:**

- The 18" crushed stone roadway base shall be compacted in two 9" lifts.
- Asphalt emulsion for tack coat shall be applied at the rate of 0.07 gal/sy for milled surfaces and 0.05 gal/sy for smooth paved surfaces, subsidiary to paving.
- Pavement joint adhesive required on longitudinal joints (all lifts), subsidiary to paving.
- See general plan profiles for superelevation transition sections. See cross sections for additional cross slope grades.

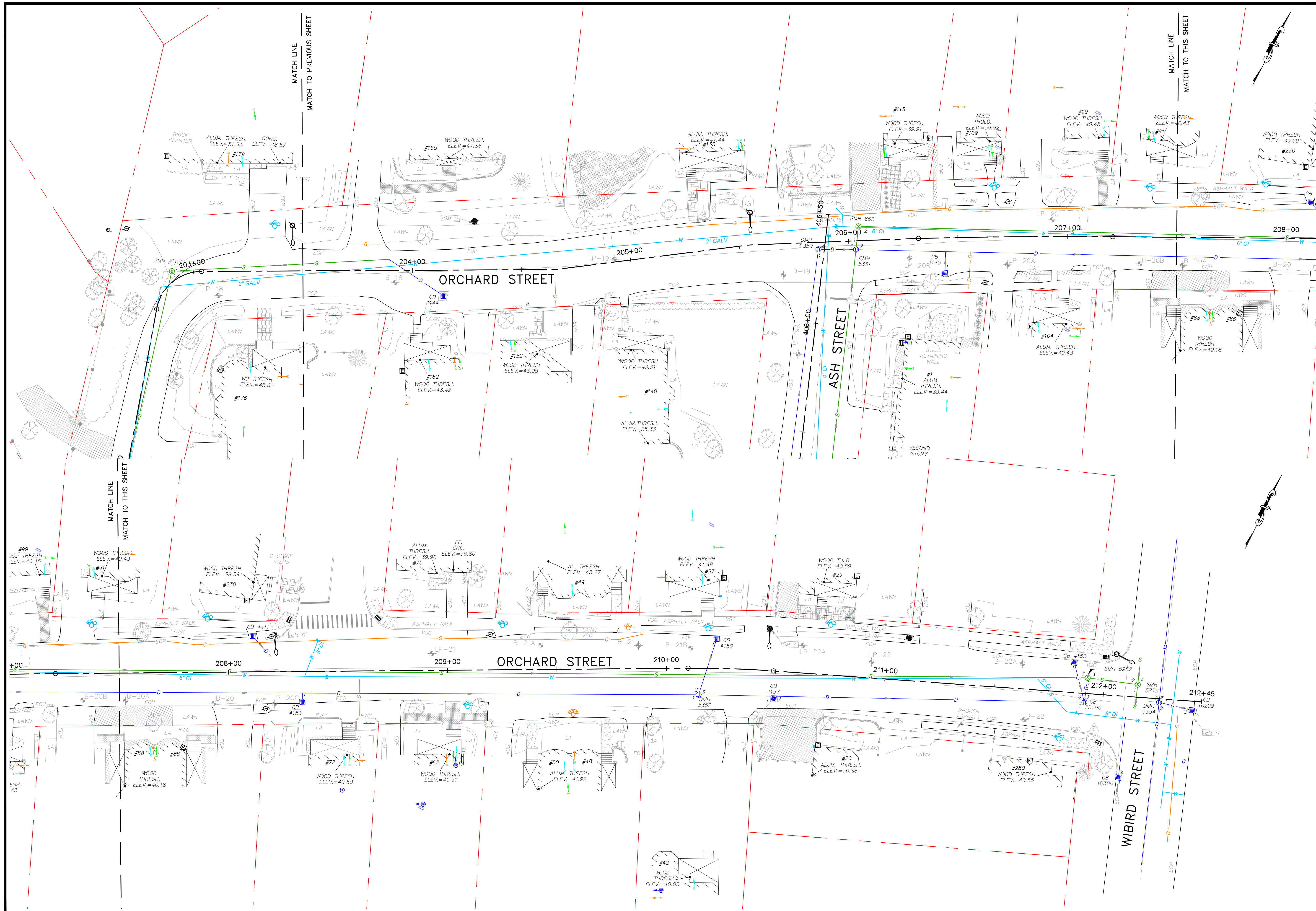
date	2/2/2024	revision	1	no.	1	issued for Bid	by	PAC
<p><b>CMA ENGINEERS</b> Civil/Environmental/Structural Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m</p>								
<p><b>PHILIP A. CORBETT</b> LICENSED PROFESSIONAL ENGINEER 2/2/2024</p>								
date:	February 2024	project no:	1211	checked by:	PAC	scale:	1" = 10'	20'
designed by:	CFC/STF	drawn by:	WWG	approved by:	PAC	<p>City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Typical Sections</p>		
<p>drawing no. <b>TS-1</b></p>								
<p>sheet: 5 of 55</p>								

















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<p>designed by:          CFC/STF</p>	<p>drawn by:          WWG</p>	<p>checked by:          PAC</p>	<p>approved by:          PAC</p>	<p>scale:          0' 20' 40'          Scale: 1" = 20'</p>
<p>date:          February 2024</p>	<p>project no.:          1211</p>	<p>checked by:          PAC</p>	<p>approved by:          PAC</p>	
<p>City of Portsmouth, New Hampshire          Department of Public Works</p>		<p>Willard Ave Area          Improvement Project          Existing Conditions Plan</p>		
<p>drawing no.          ECP-4</p>				
<p>sheet: 9 of 55</p>				





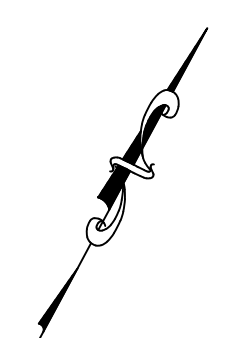
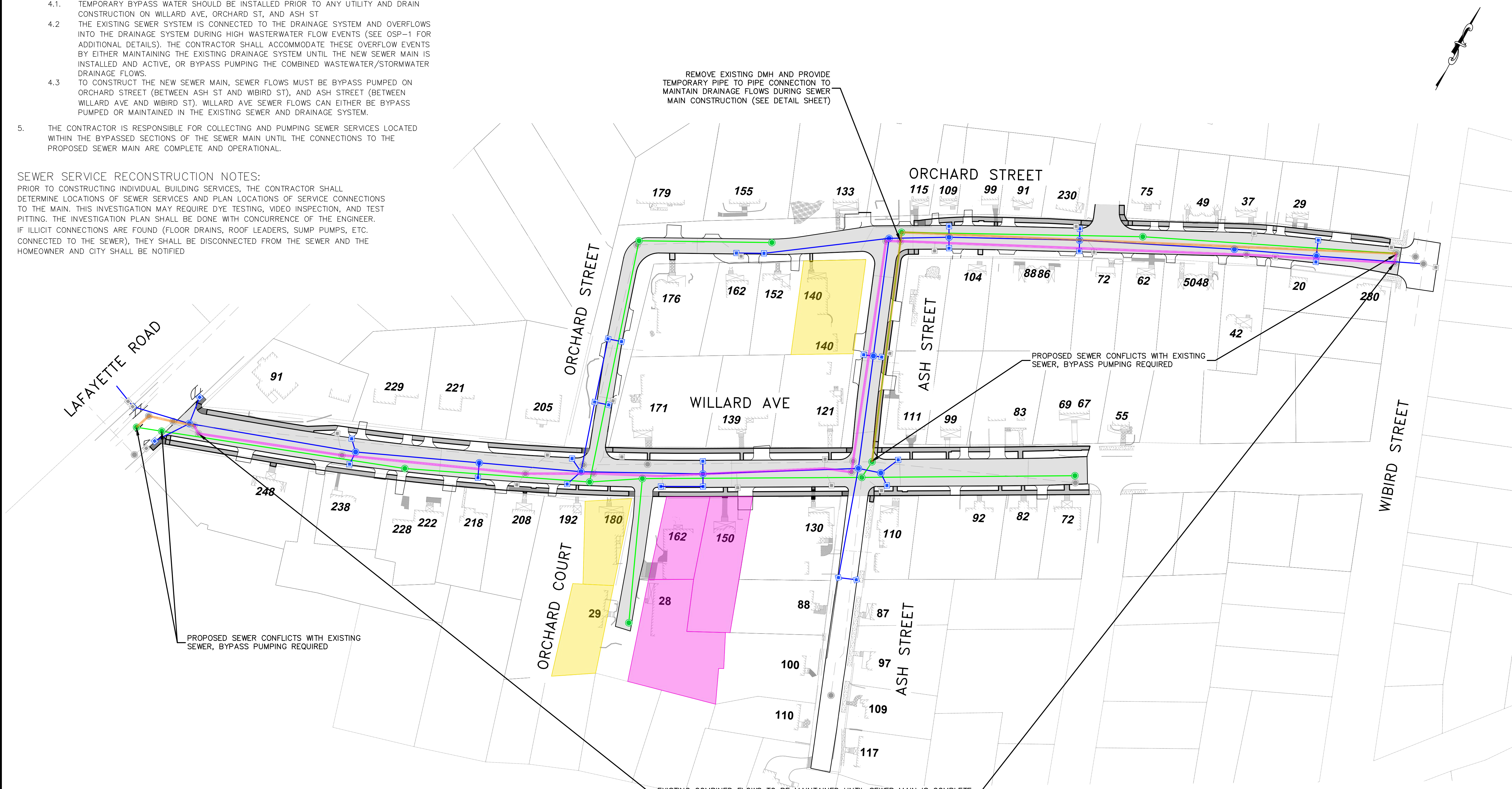
LEGEND	
	PROPOSED SEWER
	PROPOSED DRAIN
	EXISTING SEWER SEGMENTS REQUIRING BYPASS PUMPING
	EXISTING DRAINAGE TO BE MAINTAINED UNTIL SEWER MAIN IS COMPLETED
	REPLUMB SEWER SERVICE TO RECONFIGURE ROUTING
	CONFIRM SEWER SERVICE LOCATION AND CONNECTION POINT TO EXISTING


**UTILITY SEQUENCING NOTES:**

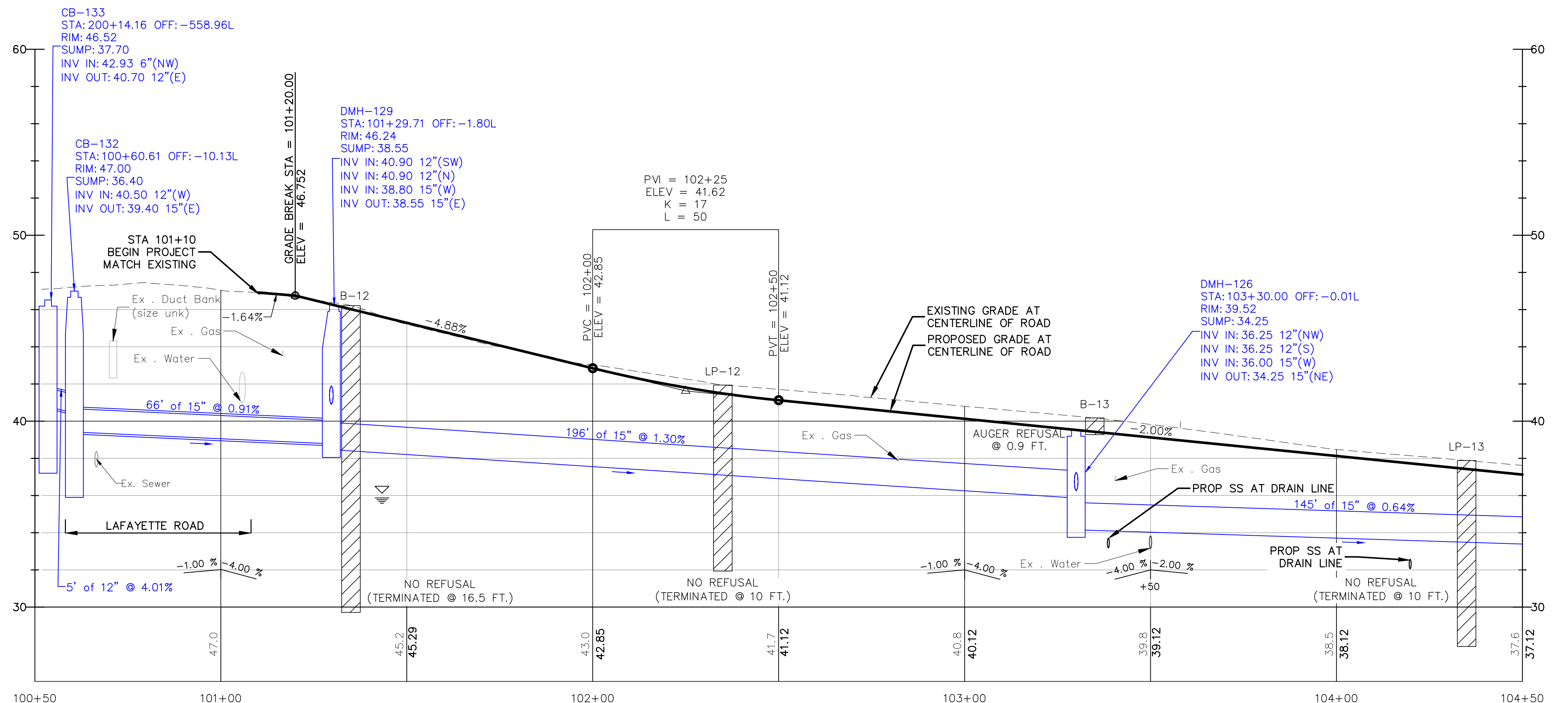
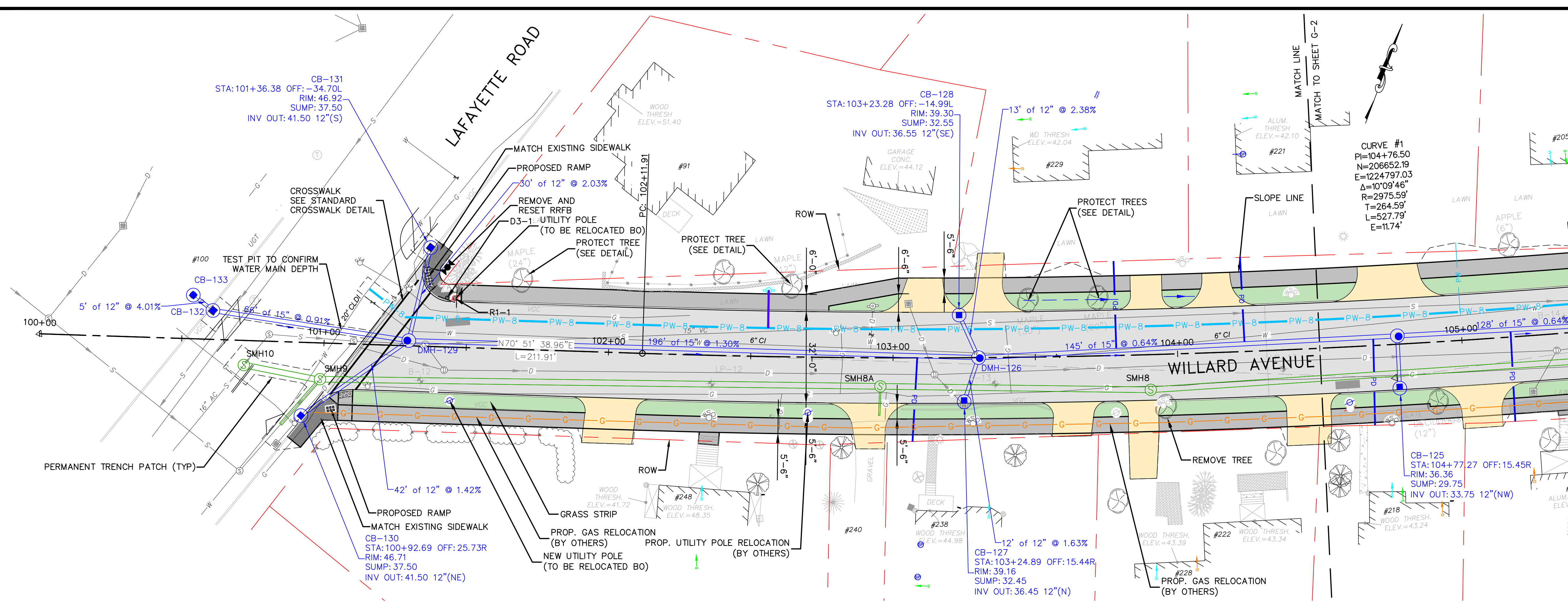
- THE CONTRACTOR SHALL MAINTAIN SEWER, STORMWATER, AND COMBINED SEWER AND DRAINAGE FLOWS DURING CONSTRUCTION.
- CONTRACTOR MUST SUBMIT A PROPOSED CONSTRUCTION SCHEDULE FOR APPROVAL BY THE CITY AND ENGINEER.
- BYPASS PIPING AND PUMPING WILL BE REQUIRED DURING CONSTRUCTION TO MAINTAIN EXISTING SEWER AND STORMWATER DRAINAGE FLOWS.
- THE FOLLOWING PRESENTS MAINTENANCE OF DRAIN AND SEWER FLOW CONSIDERATIONS AND SUGGESTED SEQUENCING:
  - TEMPORARY BYPASS WATER SHOULD BE INSTALLED PRIOR TO ANY UTILITY AND DRAIN CONSTRUCTION ON WILLARD AVE, ORCHARD ST, AND ASH ST
  - THE EXISTING SEWER SYSTEM IS CONNECTED TO THE DRAINAGE SYSTEM AND OVERFLOWS INTO THE DRAINAGE SYSTEM DURING HIGH WASTERWATER FLOW EVENTS (SEE OSP-1 FOR ADDITIONAL DETAILS). THE CONTRACTOR SHALL ACCOMMODATE THESE OVERFLOW EVENTS BY EITHER MAINTAINING THE EXISTING DRAINAGE SYSTEM UNTIL THE NEW SEWER MAIN IS INSTALLED AND ACTIVE, OR BYPASS PUMPING THE COMBINED WASTEWATER/STORMWATER DRAINAGE FLOWS.
  - TO CONSTRUCT THE NEW SEWER MAIN, SEWER FLOWS MUST BE BYPASS PUMPED ON ORCHARD STREET (BETWEEN ASH ST AND WIBIRD ST), AND ASH STREET (BETWEEN WILLARD AVE AND WIBIRD ST). WILLARD AVE SEWER FLOWS CAN EITHER BE BYPASS PUMPED OR MAINTAINED IN THE EXISTING SEWER AND DRAINAGE SYSTEM.
- THE CONTRACTOR IS RESPONSIBLE FOR COLLECTING AND PUMPING SEWER SERVICES LOCATED WITHIN THE BYPASSED SECTIONS OF THE SEWER MAIN UNTIL THE CONNECTIONS TO THE PROPOSED SEWER MAIN ARE COMPLETE AND OPERATIONAL.

**SEWER SERVICE RECONSTRUCTION NOTES:**

PRIOR TO CONSTRUCTING INDIVIDUAL BUILDING SERVICES, THE CONTRACTOR SHALL DETERMINE LOCATIONS OF SEWER SERVICES AND PLAN LOCATIONS OF SERVICE CONNECTIONS TO THE MAIN. THIS INVESTIGATION MAY REQUIRE DYE TESTING, VIDEO INSPECTION, AND TEST PITTING. THE INVESTIGATION PLAN SHALL BE DONE WITH CONCURRENCE OF THE ENGINEER. IF ILLICIT CONNECTIONS ARE FOUND (FLOOR DRAINS, ROOF LEADERS, SUMP PUMPS, ETC. CONNECTED TO THE SEWER), THEY SHALL BE DISCONNECTED FROM THE SEWER AND THE HOMEOWNER AND CITY SHALL BE NOTIFIED



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designed by: CFC/STF drawn by: WWG approved by: PAC	scale: 0 50' 100' Scale: 1" = 50'	
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Utility Sequencing Plan Proposed		
drawing no. <b>OSP-2</b>		
sheet: 12 of 55		
no. 1	revision	date 2/2/2024
by PAC		

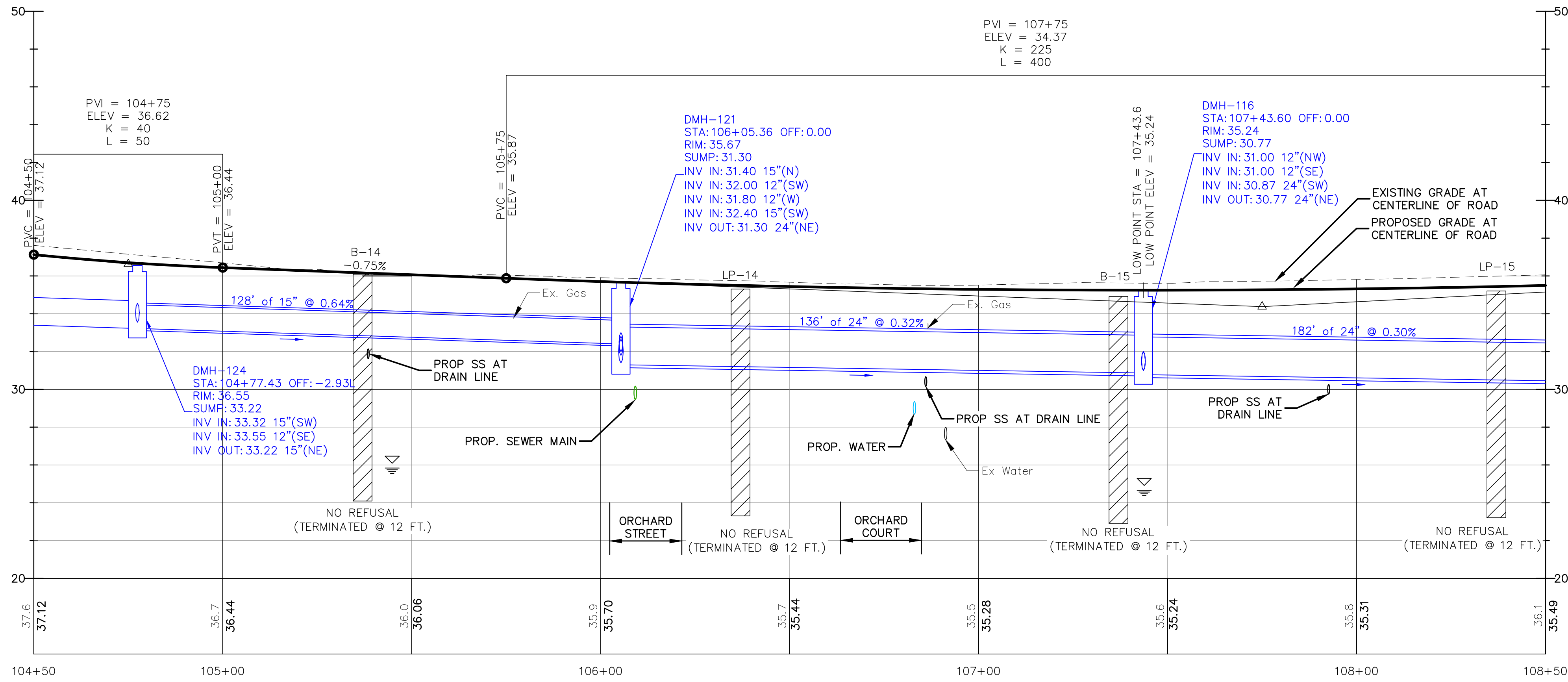
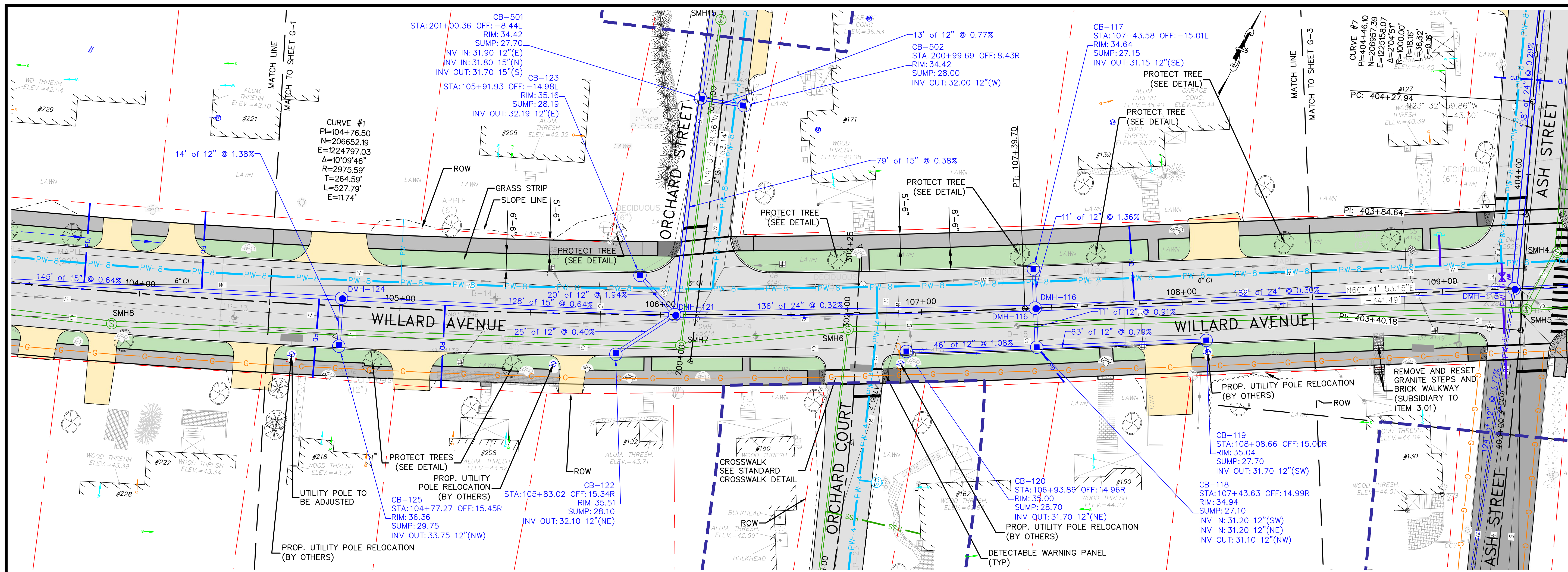


designed by:	CFC/STF	date:	February 2024
drawn by:	WWG	project no.:	1211
approved by:	PAC	checked by:	PAC
scale:	1" = 20'H/4'V	date:	2/2/2024
revision:	1	Issued for Bid	2/2/2024
no.:	1	date:	2/2/2024
revision:		date:	2/2/2024

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**City of Portsmouth, New Hampshire**  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Proposed Roadway & Drainage  
 Willard Ave STA 101+00 to STA 104+50

drawing no. **G-1**  
 sheet: 13 of 55



designed by:	CFC/STF	date:	February 2024
drawn by:	WVG	project no.:	1211
approved by:	PAC	checked by:	PAC
scale:	1" = 20H/4V	scale:	1" = 20H/4V

City of Portsmouth, New Hampshire Department of Public Works	Willard Ave Area Improvement Project	Proposed Roadway & Drainage Willard Ave STA 104+50 to STA 108+50
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drawing no.:	G-2
sheet:	14 of 55

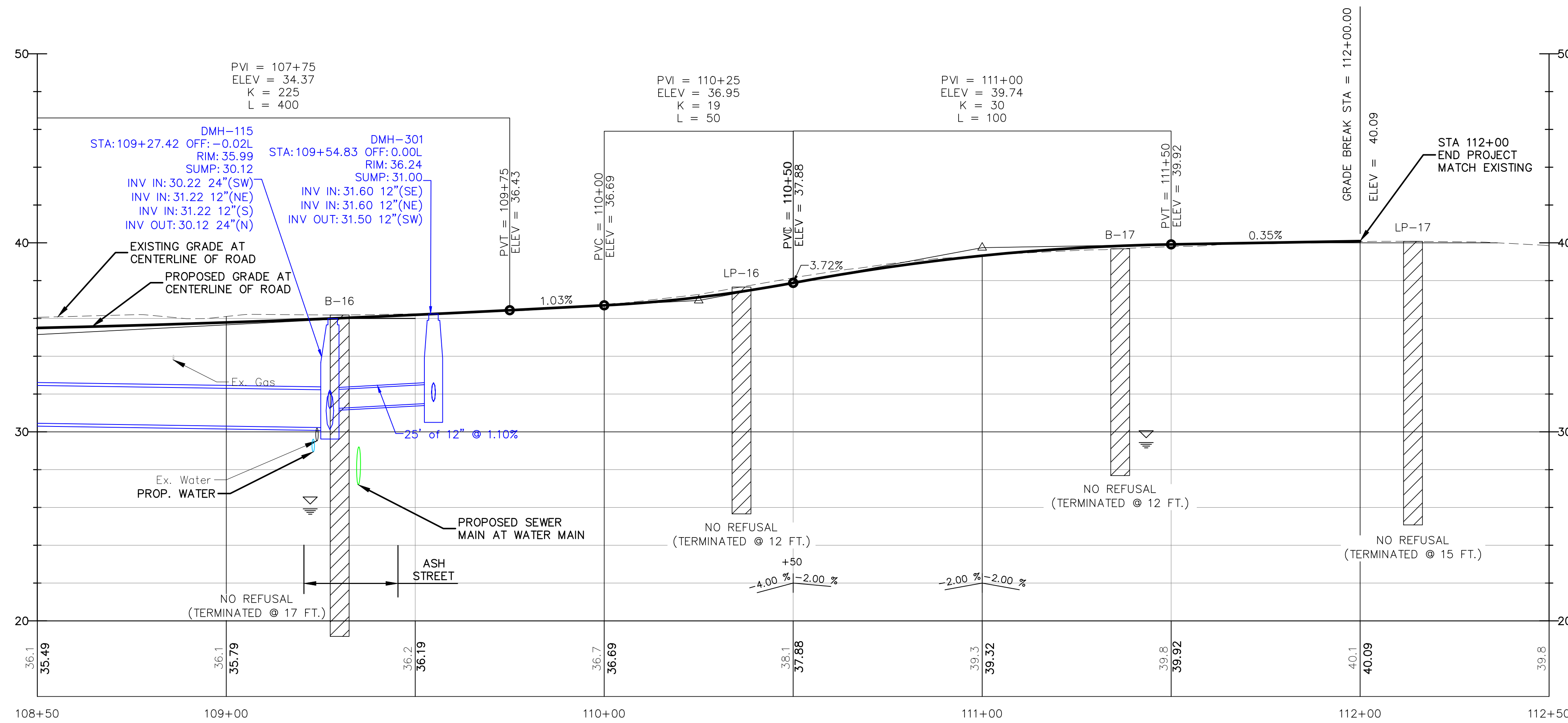
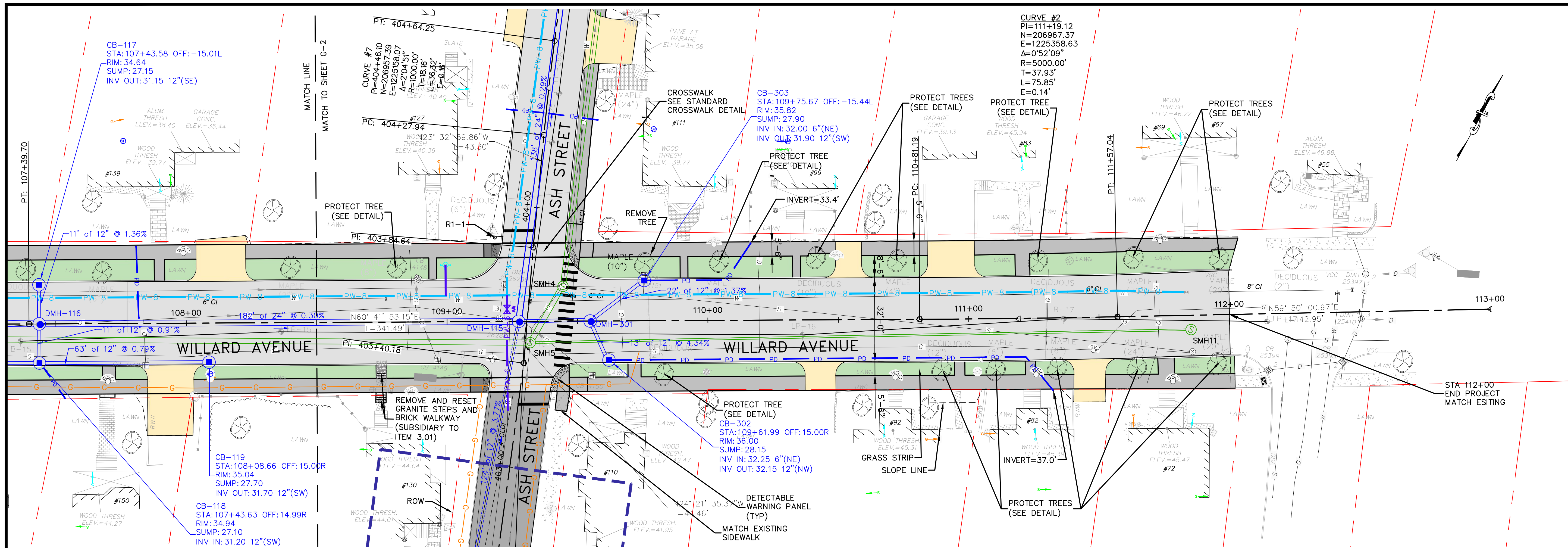
  

revision	no.	Issued for Bid	date	by
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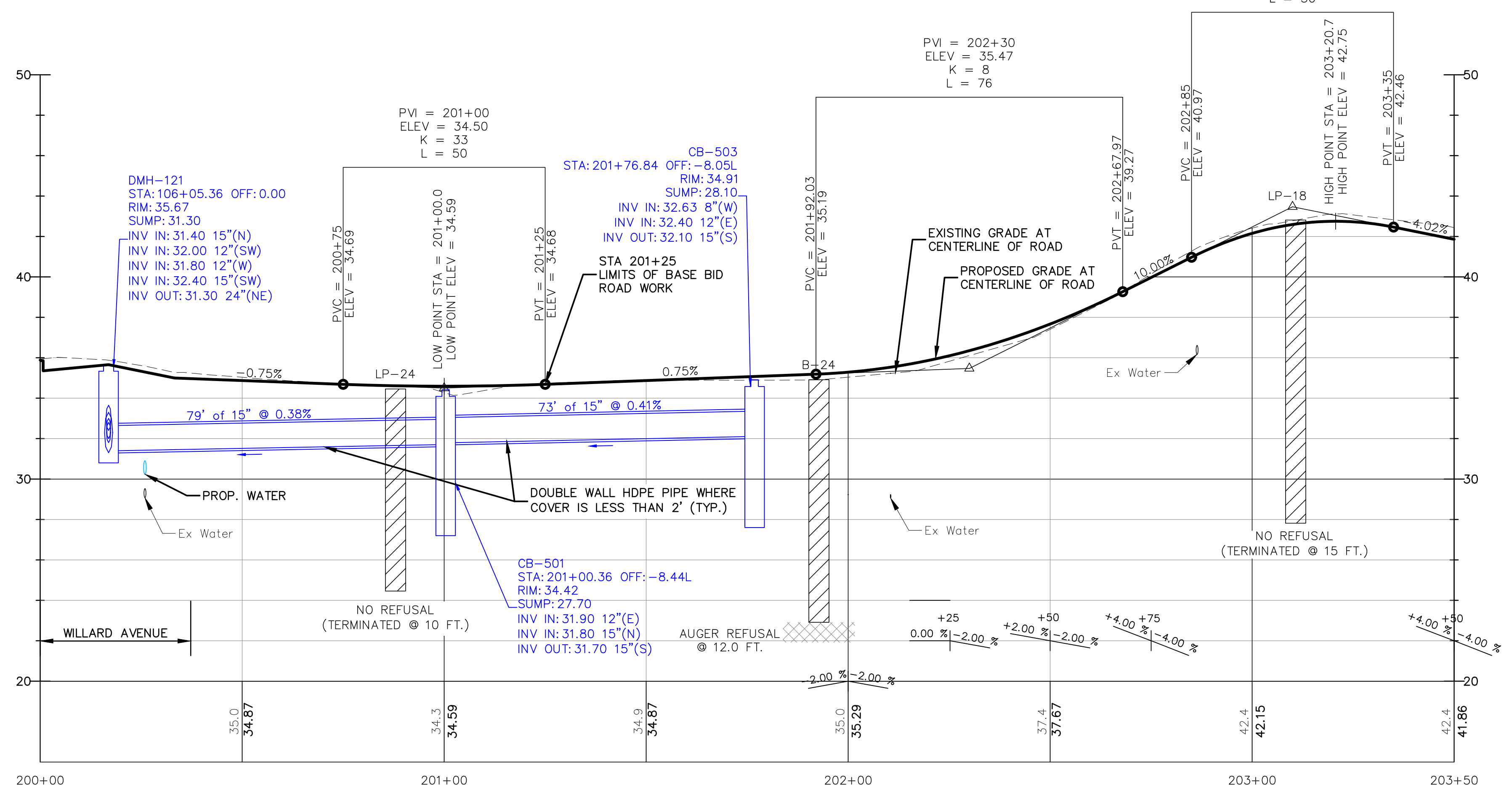
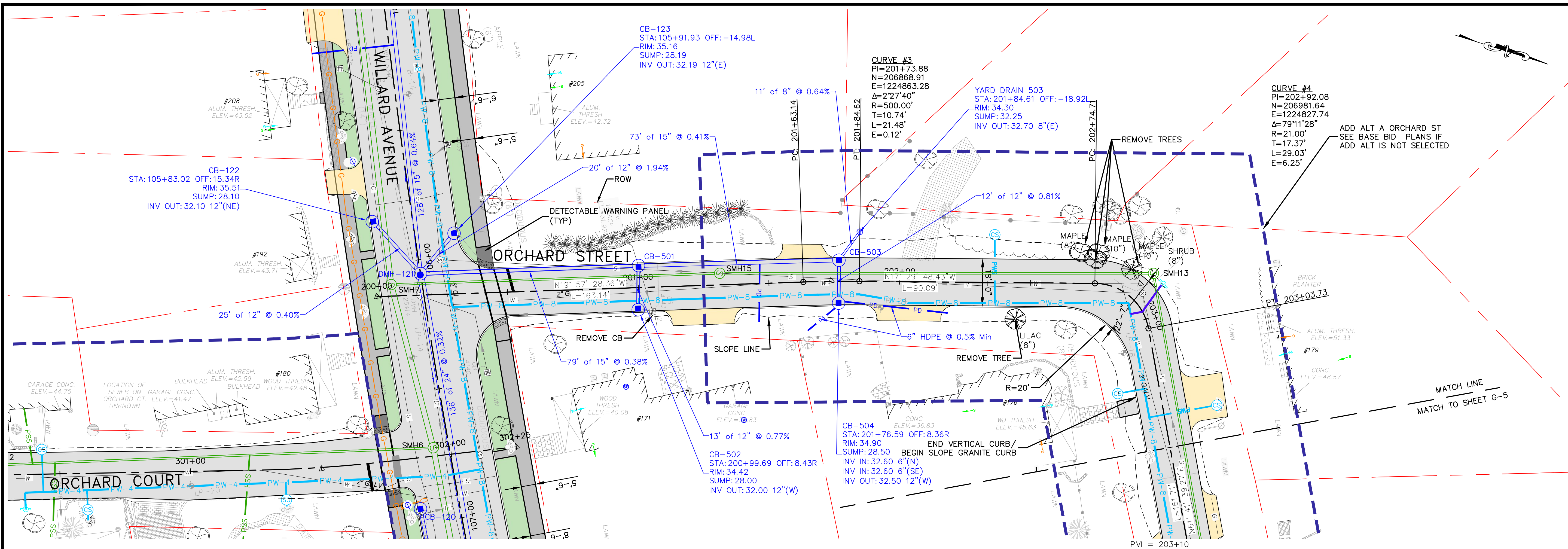
  

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PHILIP A. CORRELL  
 LICENSED PROFESSIONAL ENGINEER  
 2/2/2024

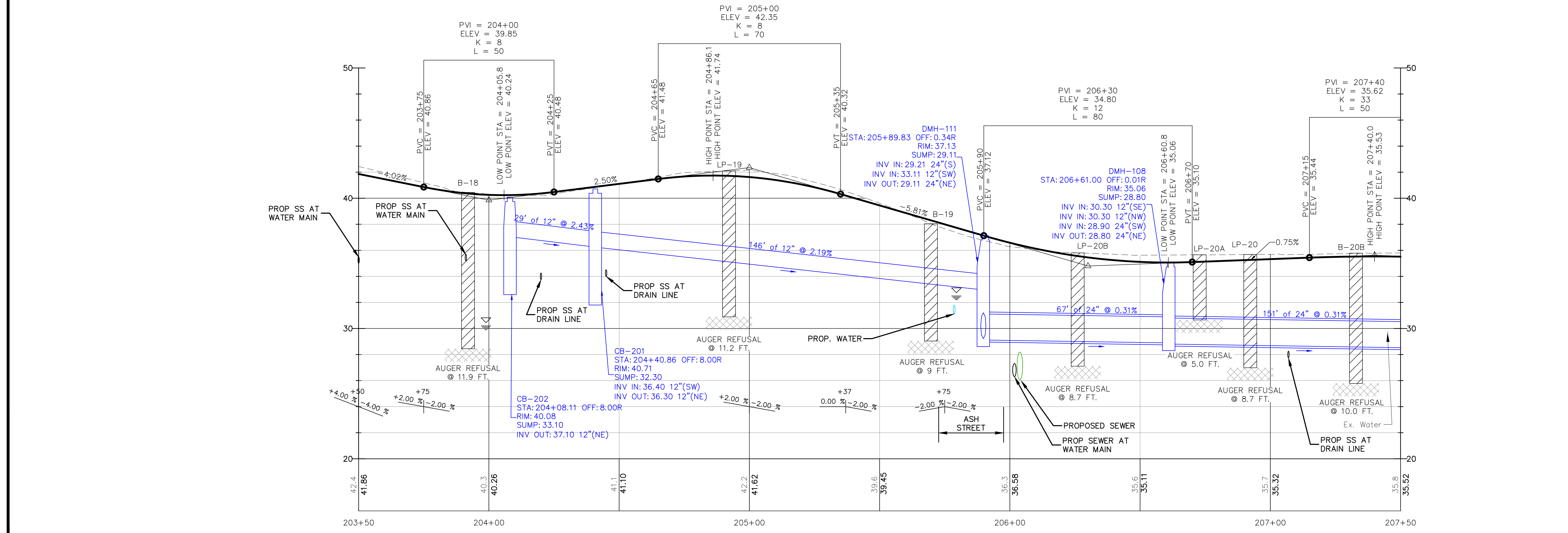
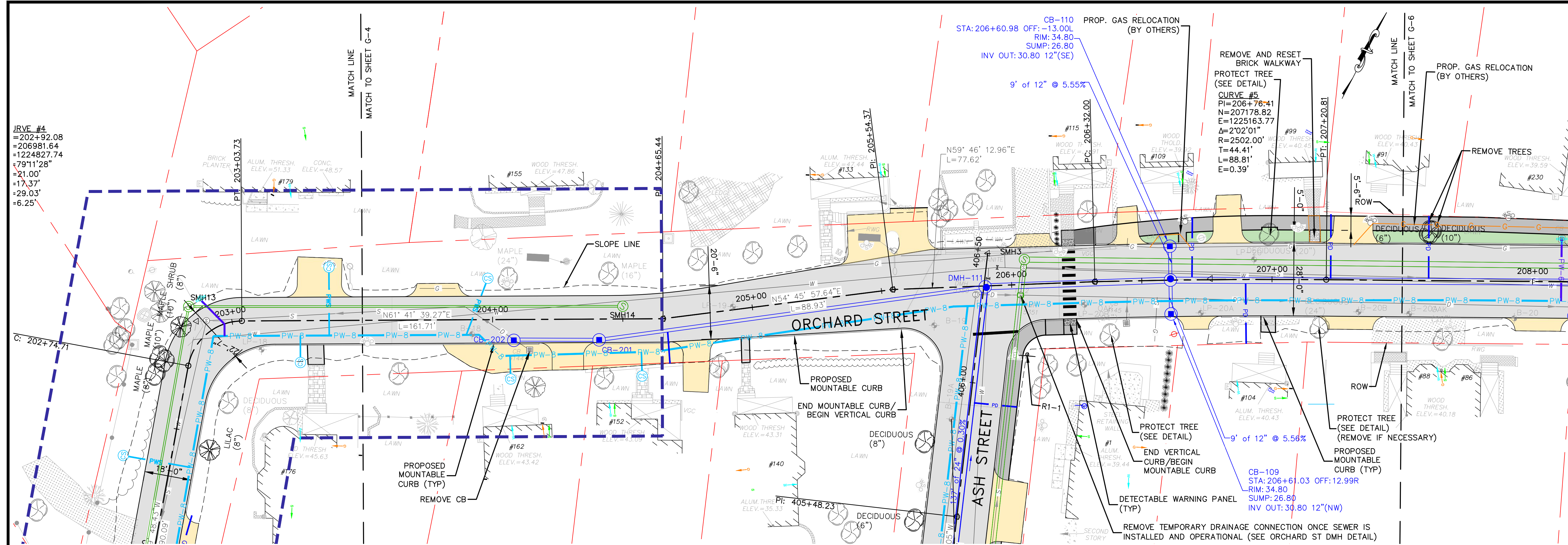


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date: February 2024	project no.: 1211	checked by: PAC	scale: 0 20' 40' Scale: 1" = 20H/4'V	
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project Proposed Roadway & Drainage Willard Ave STA 108+50 to STA 112+50		
drawing no. <b>G-3</b>				
sheet: 15 of 55				



 CIVIL/ENVIRONMENTAL/STRUCTURAL		Issued for Bid 1	no.
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drawing no. <b>G-4</b>		drawn by: WWG	project no.: 1211
sheet: 16 of 55		approved by: PAC	checked by: PAC
scale: 1" = 20H/4'V		scale: 0 20' 40'	date: 2/2/2024
by PAC		date 2/2/2024	revision 1





designed by:	CFC/STF	date:	February 2024
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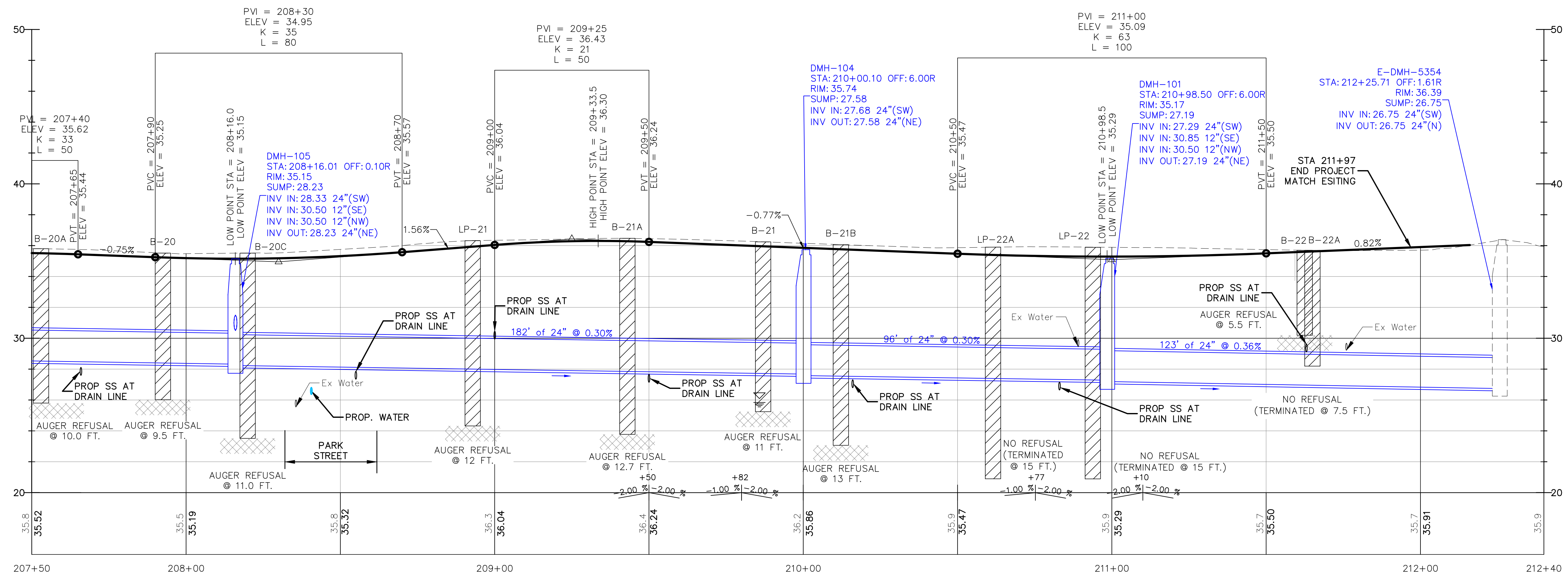
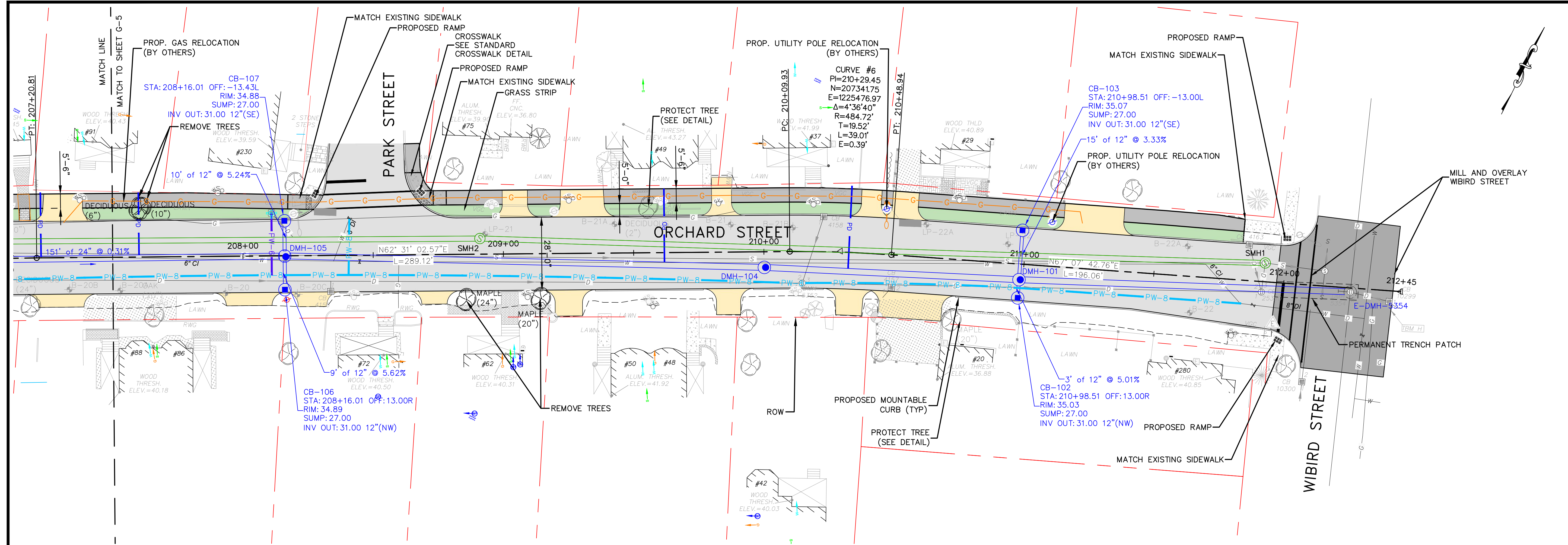
City of Portsmouth, New Hampshire  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Proposed Roadway & Drainage  
 Orchard St STA 203+50 to STA 207+50

drawing no. G-5  
 sheet: 17 of 55

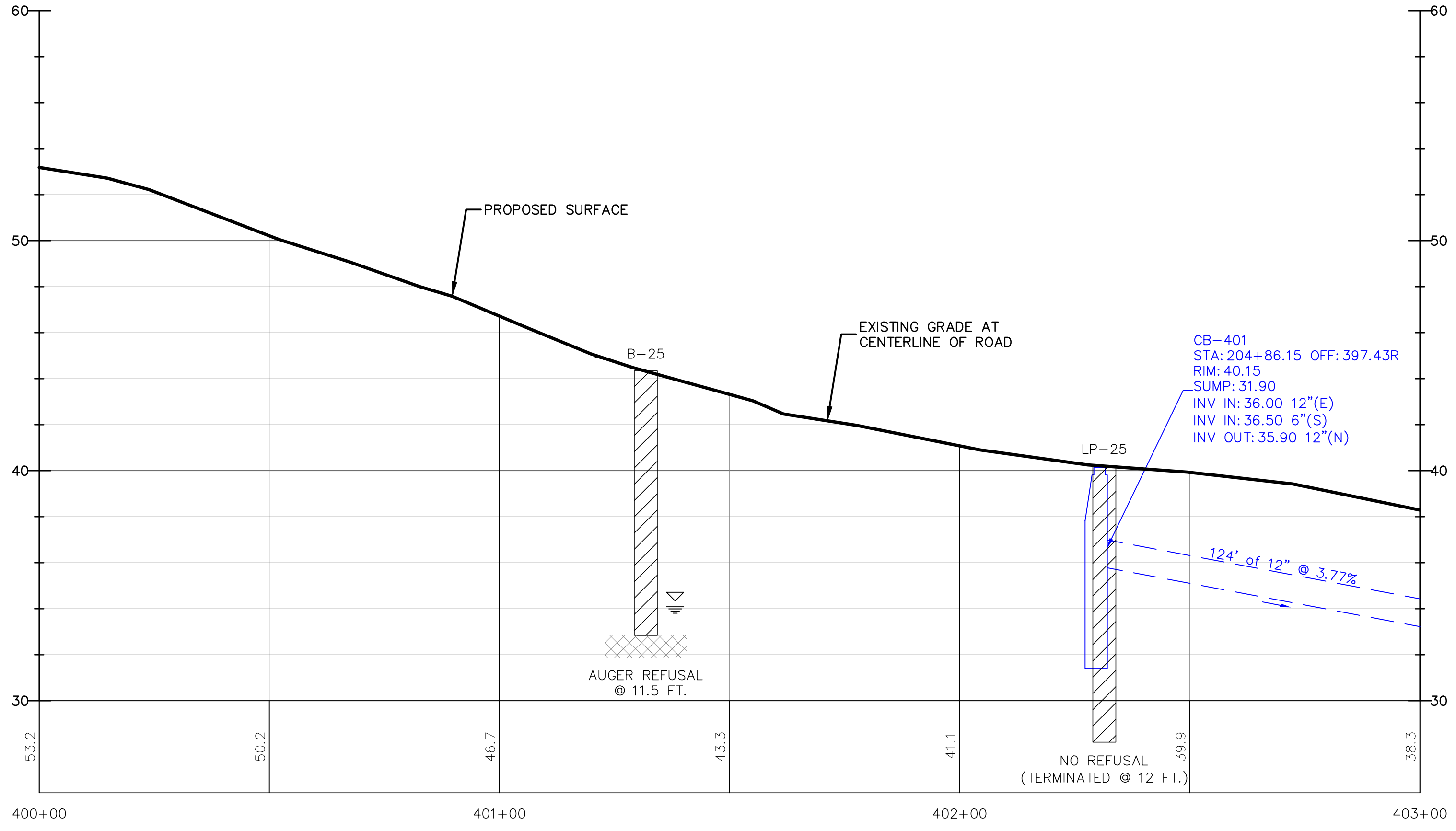
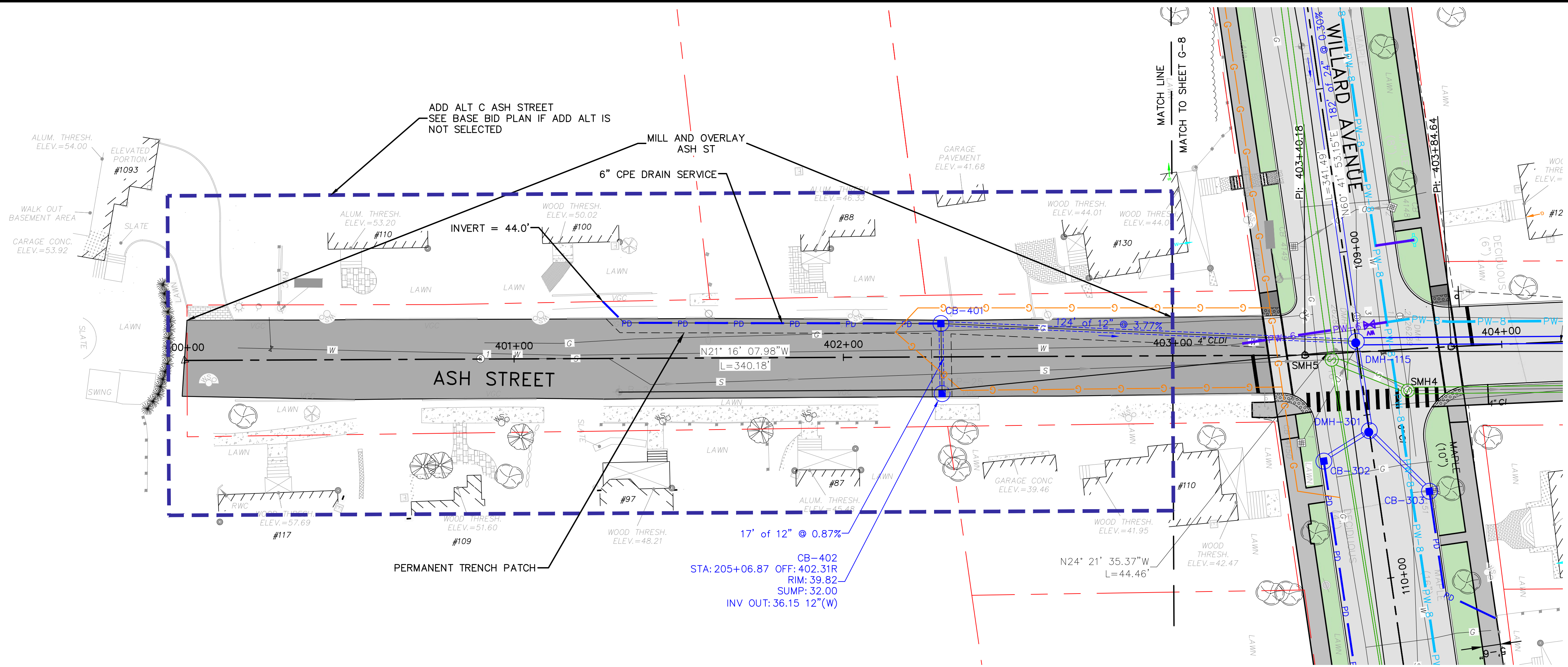
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no.	date	revision
1	2/2/2024	Issued for Bid

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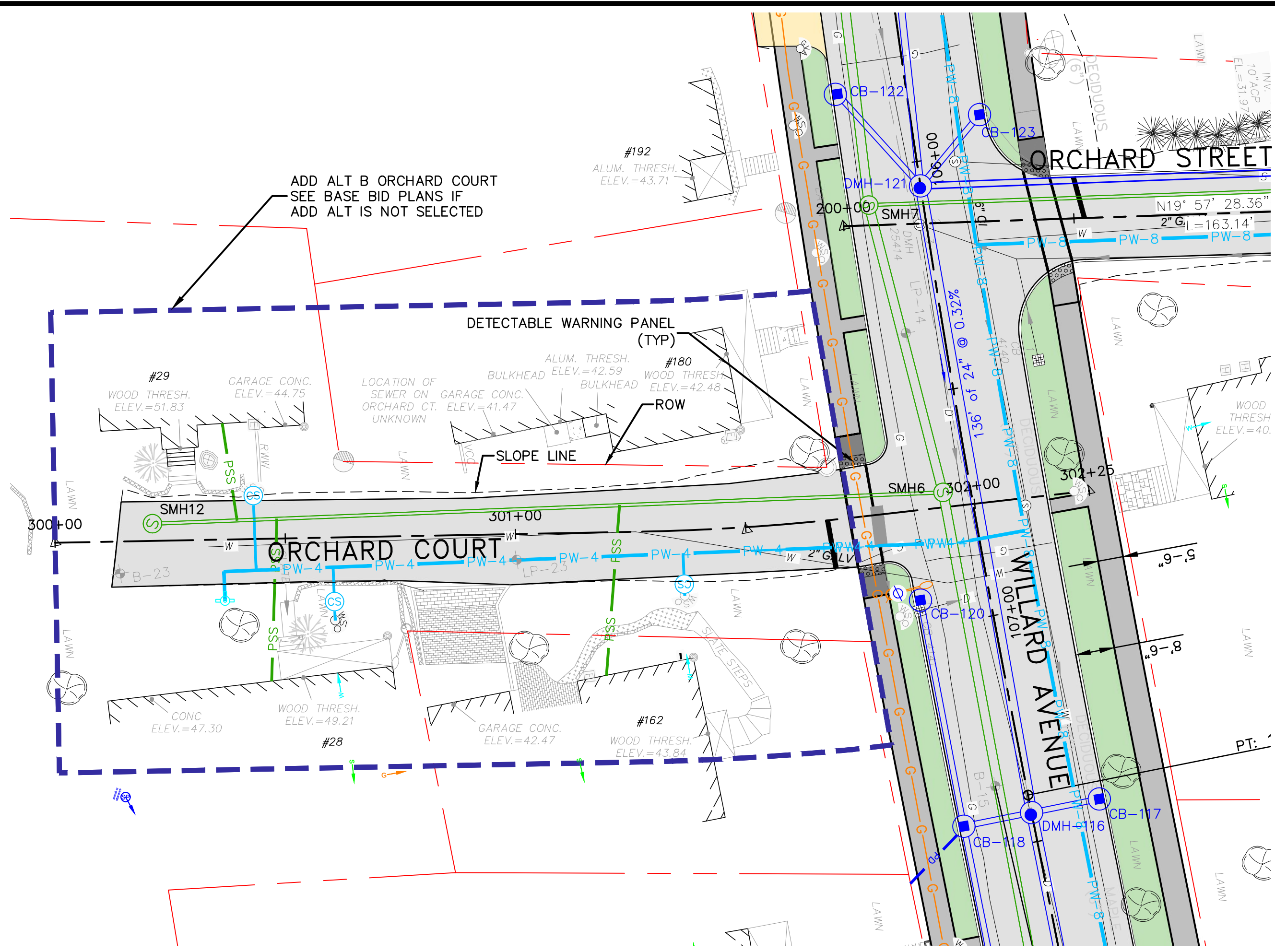


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designed by: CFC/STF	drawn by: WWG
date: February 2024	project no.: 1211
checked by: PAC	approved by: PAC
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City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Proposed Roadway & Drainage Orchard St STA 207+50 to STA 212+40	
drawing no. <b>G-6</b>	
sheet: 18 of 55	

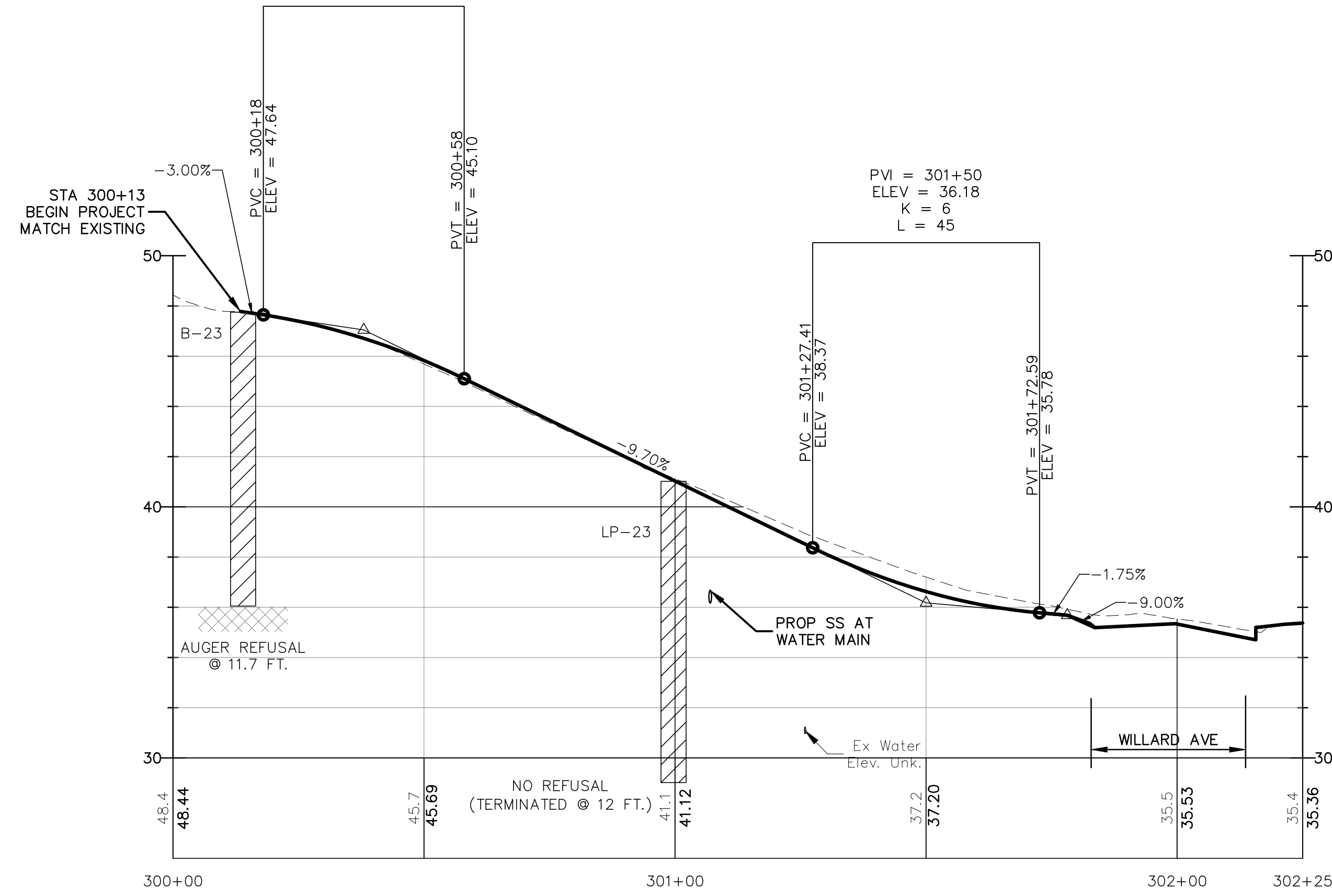


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City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project		Proposed Roadway & Drainage Ash St STA 400+00 to STA 403+00	
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no. 1		revision		date: 2/2/2024 by: PAC	

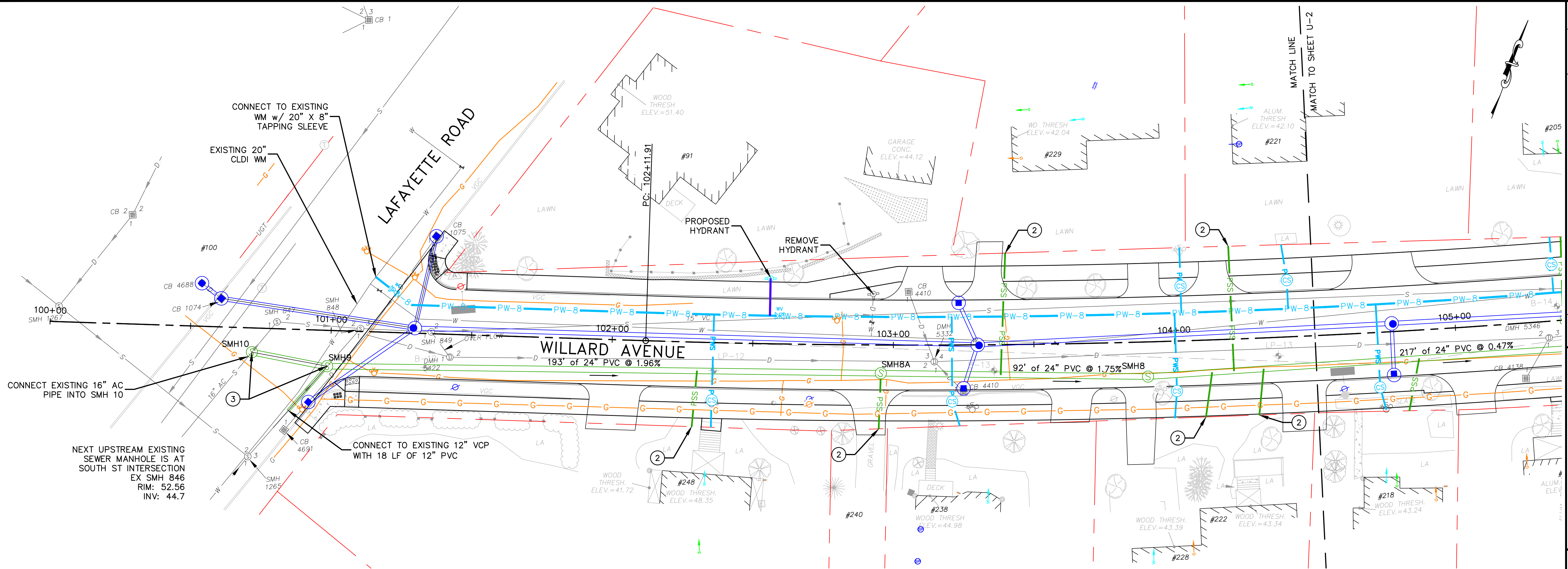




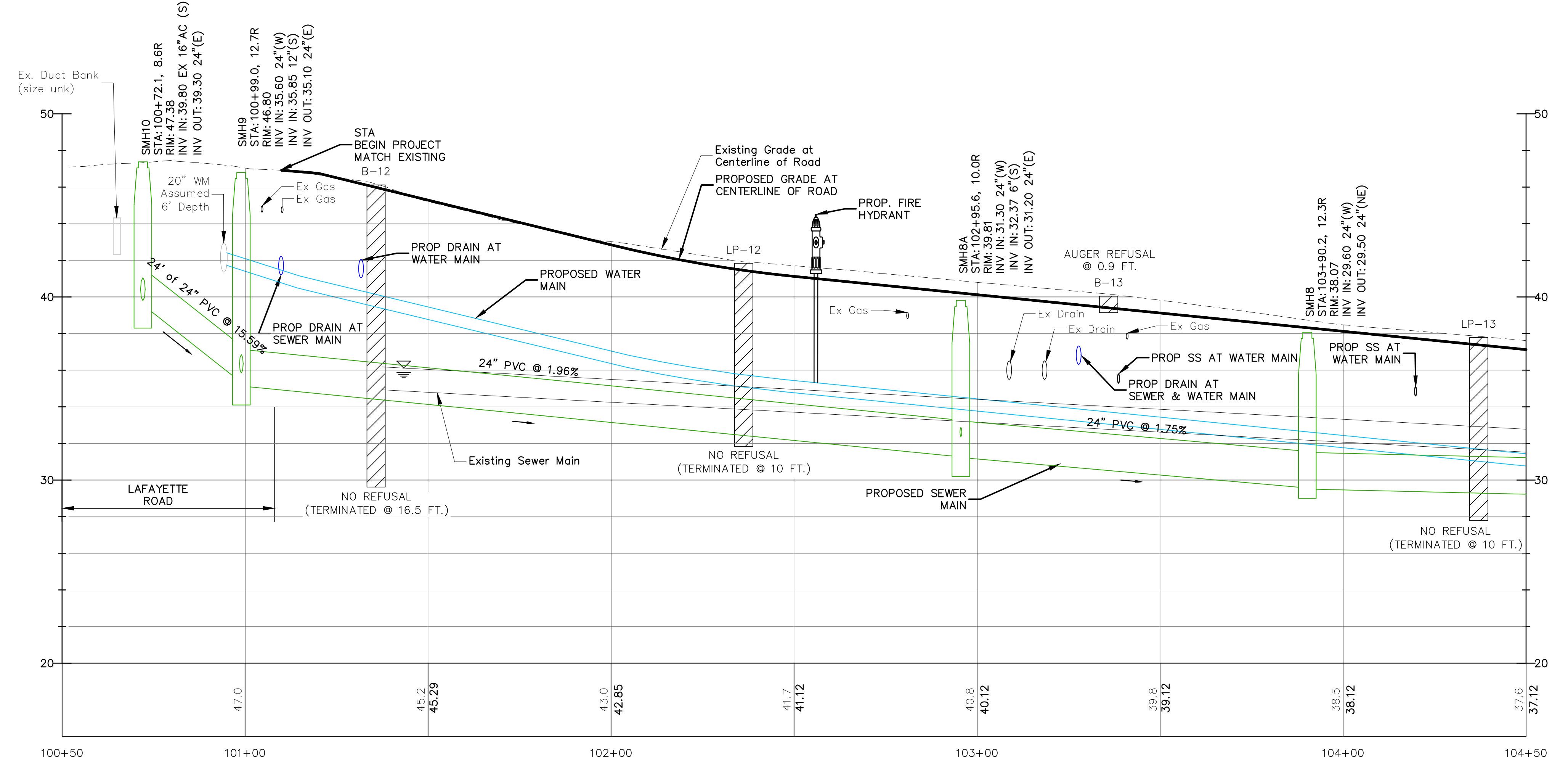
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<p>2/2/2024</p>	
<p>date: February 2024</p> <p>project no: 1211</p>	<p>designed by: CFC/STF</p> <p>drawn by: WWG</p> <p>checked by: PAC</p> <p>approved by: PAC</p>
<p>City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Proposed Roadway &amp; Drainage Orchard Ct STA 300+00 to STA 302+25</p>	
<p>drawing no: <b>G-9</b></p>	
<p>sheet: 21 of 55</p>	
<p>no. 1</p>	<p>revision</p>
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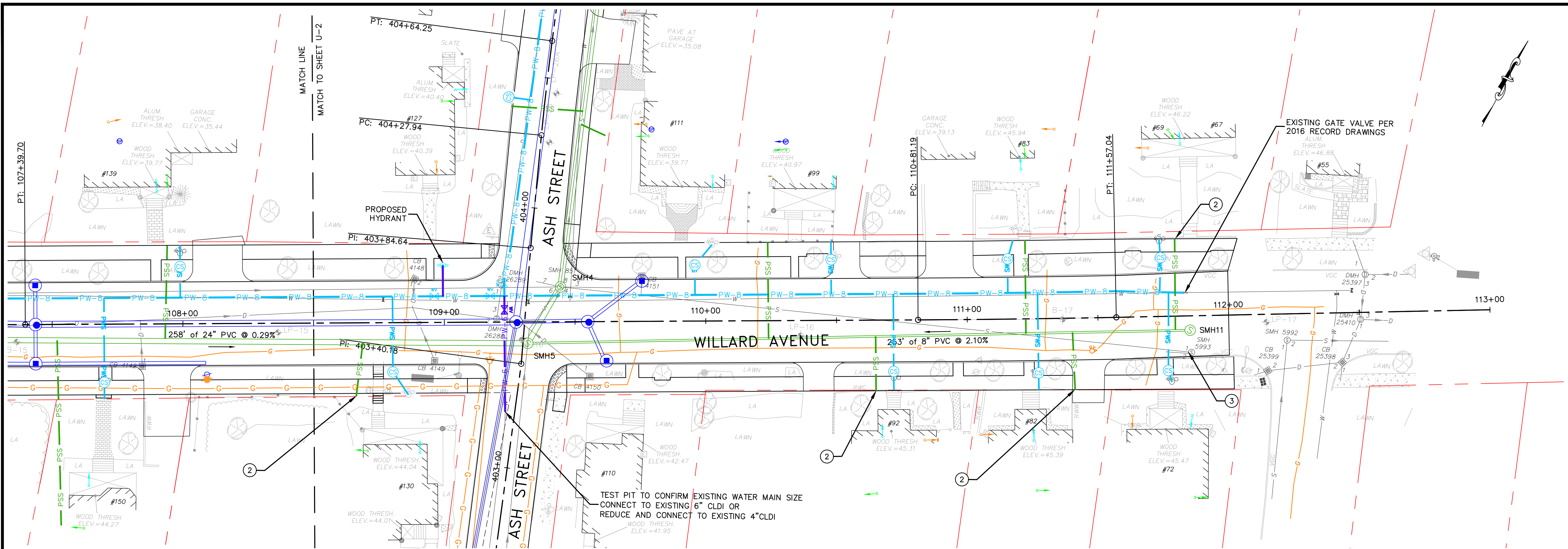


- NOTES:**
- EXISTING CURB STOP LOCATION NOT FOUND. PROPOSED WATER SERVICE LOCATION SUBJECT TO CHANGE DURING CONSTRUCTION.
  - PRIOR TO CONSTRUCTING INDIVIDUAL BUILDING SERVICES, THE CONTRACTOR SHALL DETERMINE LOCATIONS OF SEWER SERVICES AND PLAN LOCATIONS OF SERVICE CONNECTIONS TO THE MAIN. THIS INVESTIGATION MAY REQUIRE DYE TESTING, VIDEO INSPECTION, AND TEST PITTING. THE INVESTIGATION PLAN SHALL BE DONE WITH CONCURRENCE OF THE ENGINEER.
  - TEST PIT EXISTING SEWER MAIN AT THIS LOCATION TO DETERMINE DEPTH TO TOP OF PIPE. PRIOR TO ORDERING SEWER STRUCTURE, THE CONTRACTOR SHALL ENSURE THAT THE ENGINEER'S RESIDENT PROJECT REPRESENTATIVE IS ON SITE TO WITNESS THE TEST PIT. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO ORDERING STRUCTURES AND PROCEEDING WITH CONSTRUCTION.
  - SEE ROADWAY CROSS SECTIONS FOR SEWER SERVICE CONSTRUCTION DETAILS.

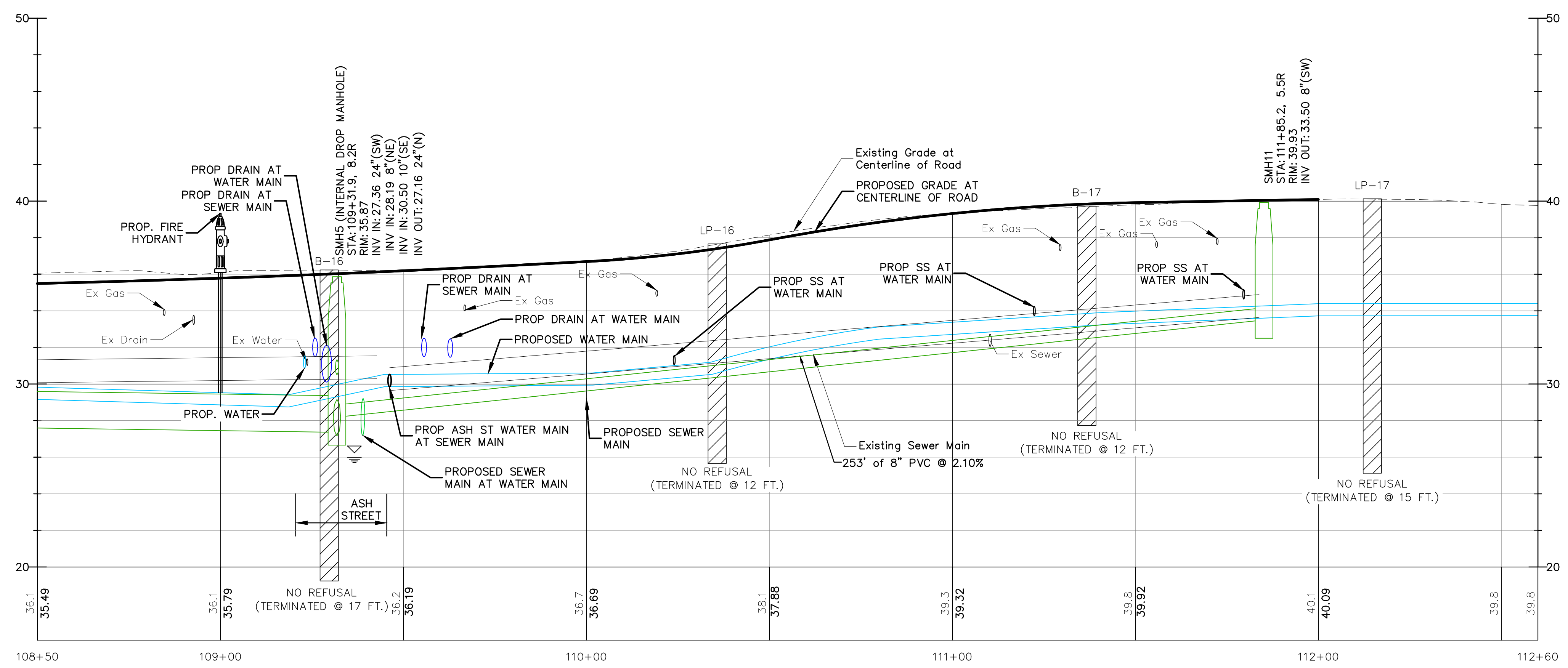


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City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Proposed Utility Plans Willard Ave STA 101+00 to STA 104+50		no. 1 revision
designed by: CFC/SJF	drawn by: WWG	approved by: PAC
date: February 2024	project no: 1211	checked by: PAC
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drawing no. <b>U-1</b>		
sheet: 22 of 55		



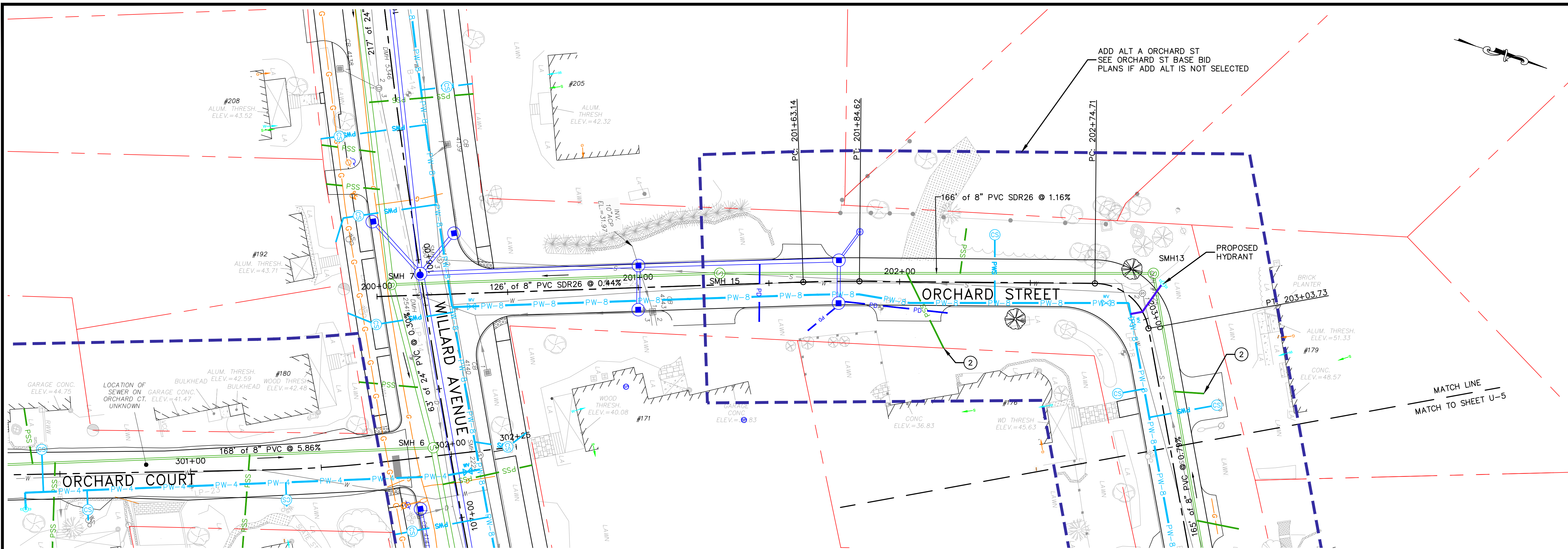


- NOTES:**
- EXISTING CURB STOP LOCATION NOT FOUND. PROPOSED WATER SERVICE LOCATION SUBJECT TO CHANGE DURING CONSTRUCTION.
  - PRIOR TO CONSTRUCTING INDIVIDUAL BUILDING SERVICES, THE CONTRACTOR SHALL DETERMINE LOCATIONS OF SEWER SERVICES AND PLAN LOCATIONS OF SERVICE CONNECTIONS TO THE MAIN. THIS INVESTIGATION MAY REQUIRE DYE TESTING, VIDEO INSPECTION, AND TEST FITTING. THE INVESTIGATION PLAN SHALL BE DONE WITH CONCURRENCE OF THE ENGINEER.
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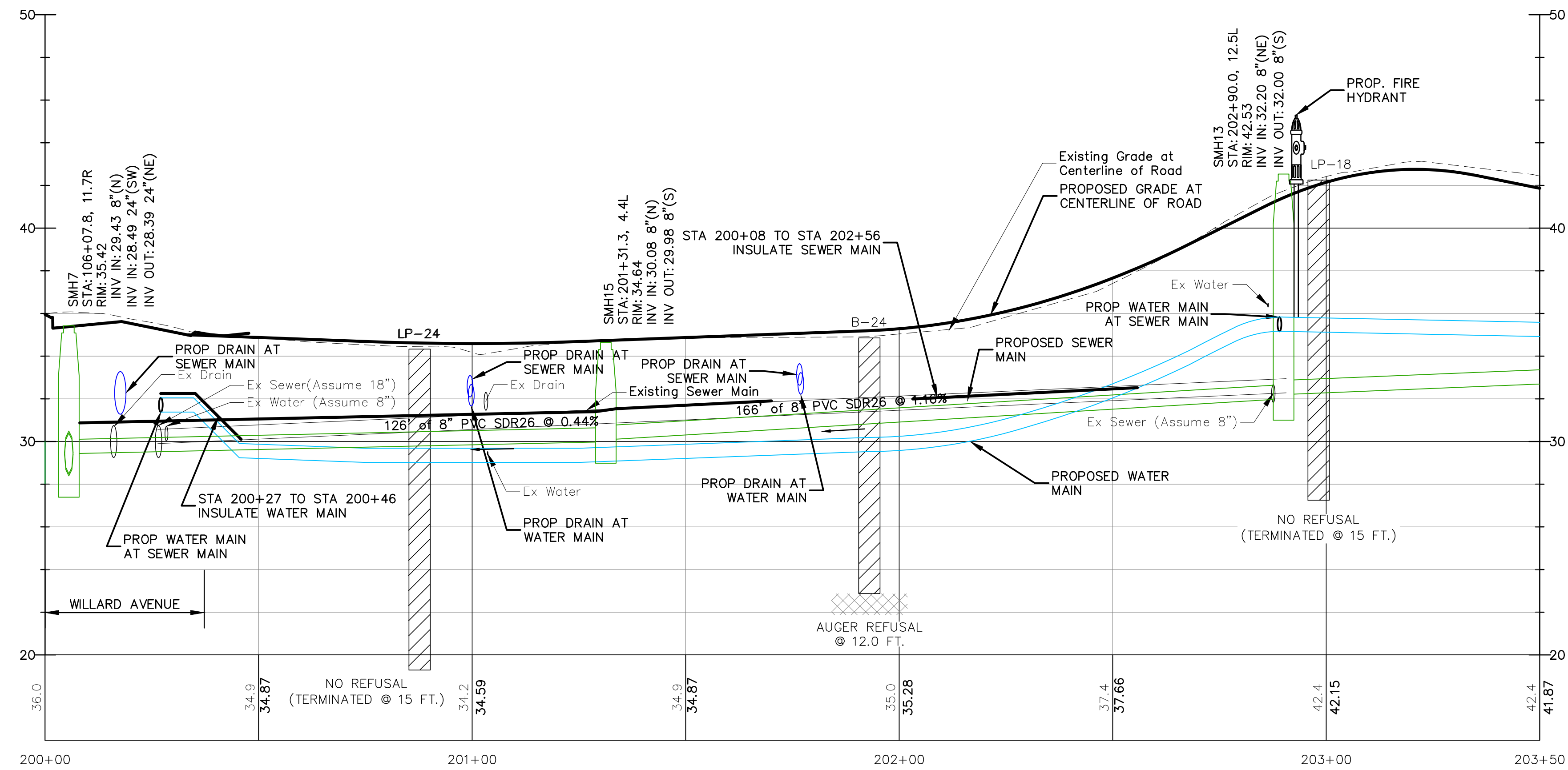


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 2/2/2024	
designed by: CFC/STF	drawn by: WVG
date: February 2024	checked by: PAC
project no.: 1211	approved by: PAC
scale: 0' 20' 40' Scale: 1" = 20'H/4'V	
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Proposed Utility Plans Willard Ave STA 108+50 to STA 112+57	
drawing no. <b>U-3</b>	
sheet: 24	of 55





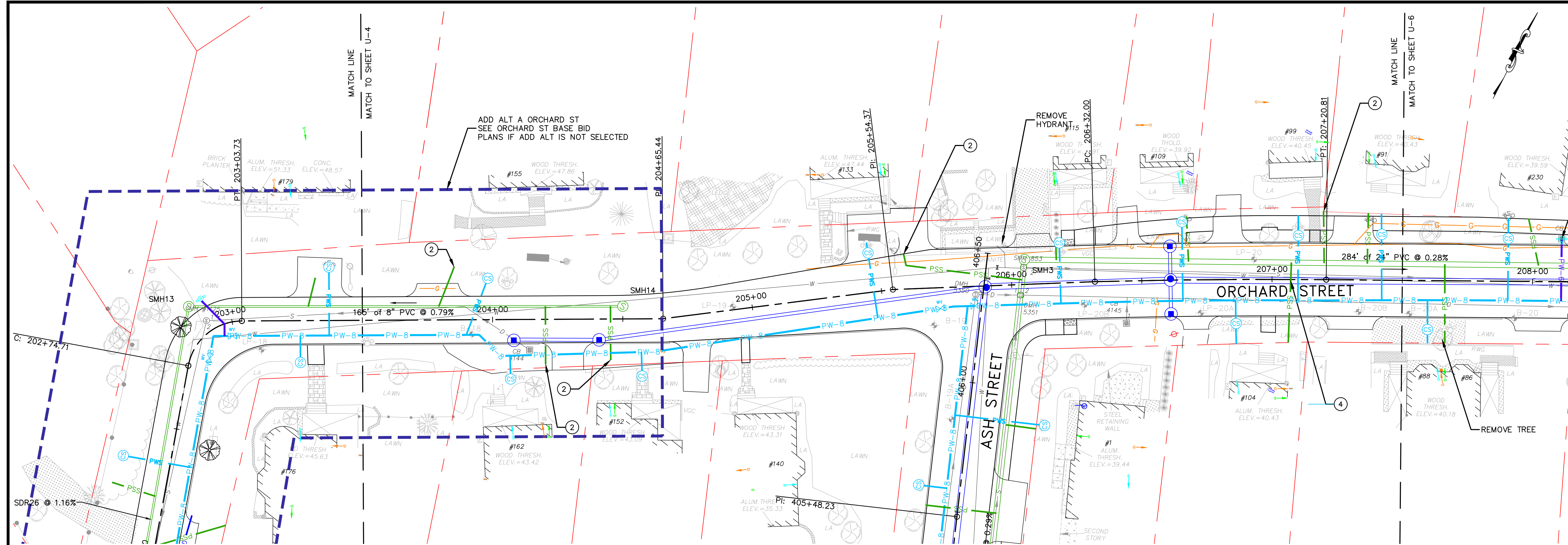
- NOTES:
- EXISTING CURB STOP LOCATION NOT FOUND, PROPOSED WATER SERVICE LOCATION SUBJECT TO CHANGE DURING CONSTRUCTION.
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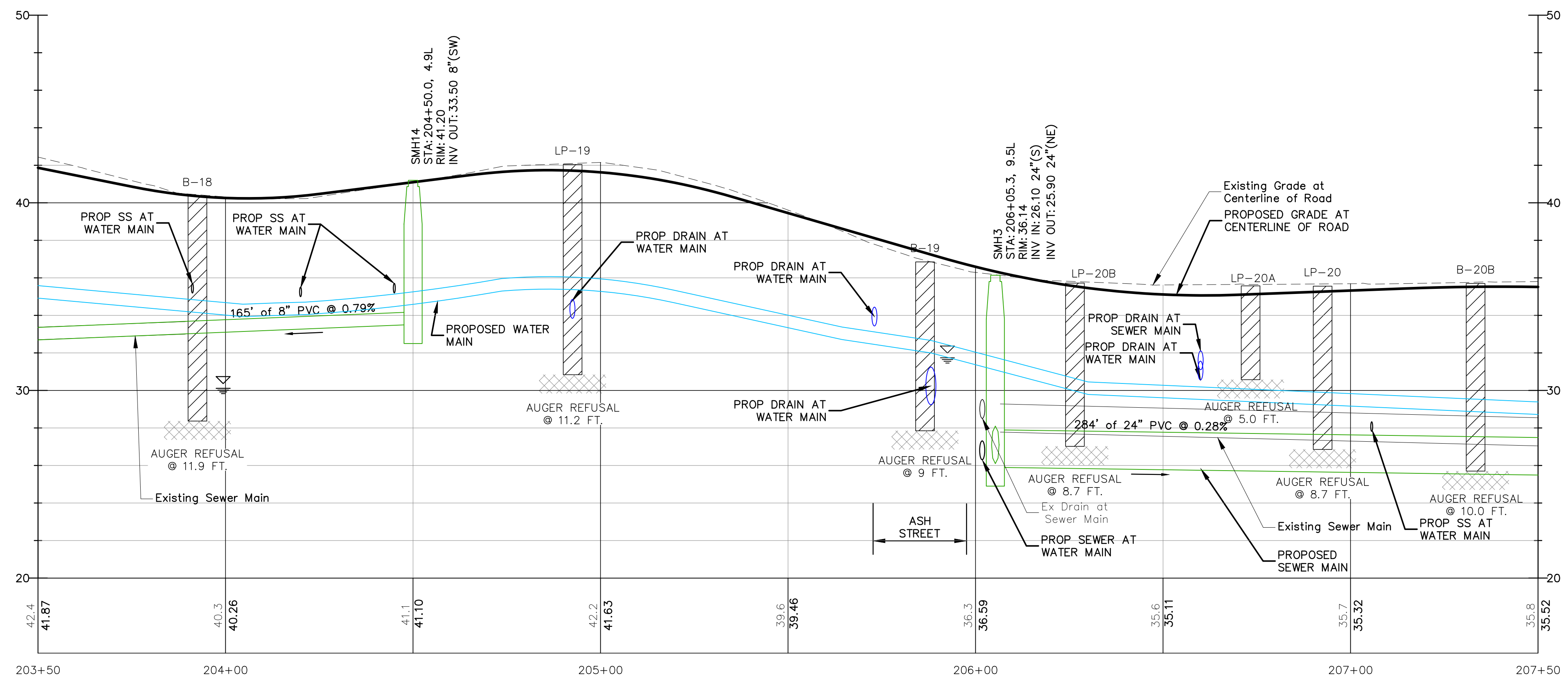
ADD ALT A ORCHARD ST  
SEE ORCHARD ST BASE BID  
PLANS IF ADD ALT IS NOT SELECTED

MATCH LINE  
MATCH TO SHEET U-5

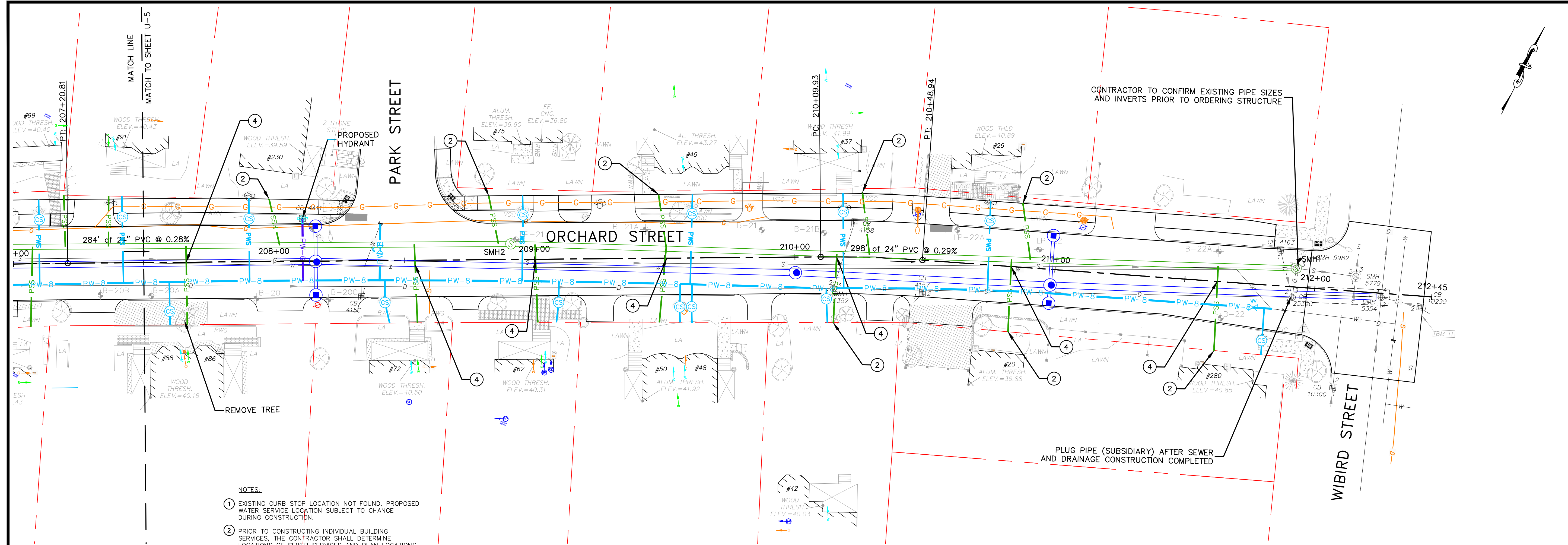
		CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m	
		2/2/2024	
designed by: CFC/STF	drawn by: WVG	checked by: PAC	approved by: PAC
date: February 2024	project no.: 1211	scale: 0 20' 40' Scale: 1" = 20H/4'V	revision 1 Issued for Bid 2/2/2024 PAC by
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project Proposed Utility Plans Orchard St STA 202+00 to STA 203+50	
drawing no. U-4		sheet: 25 of 55	



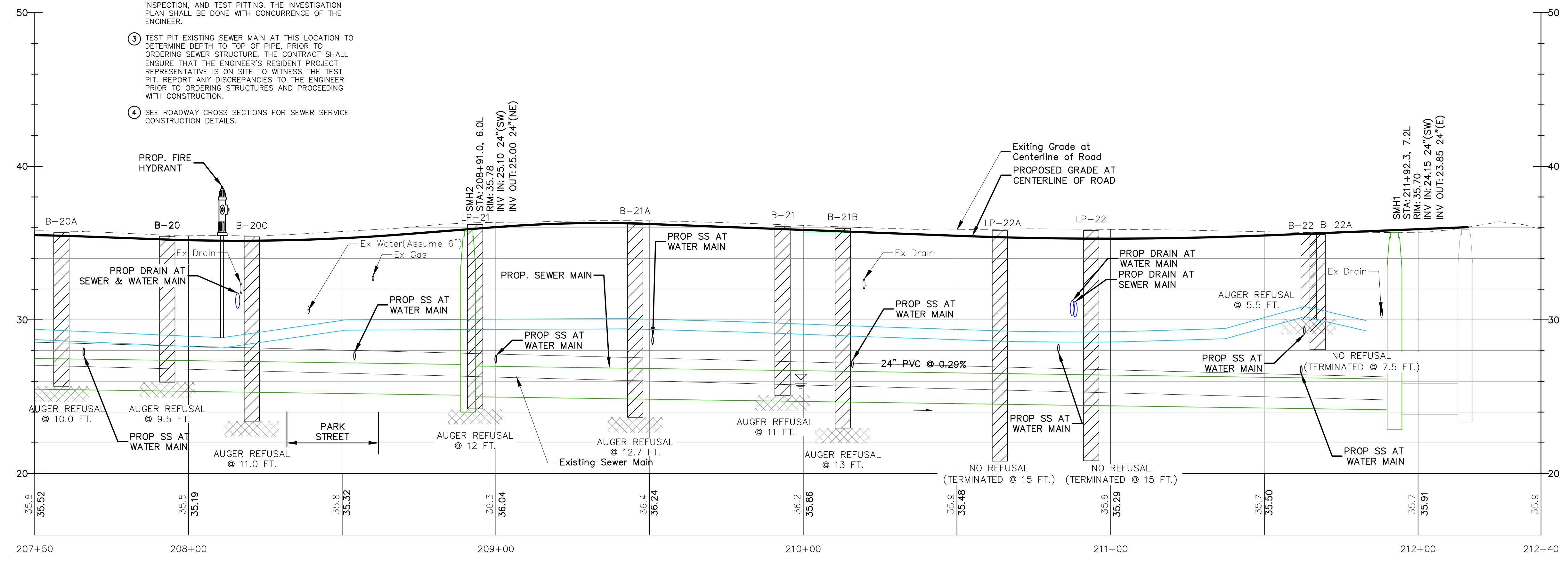
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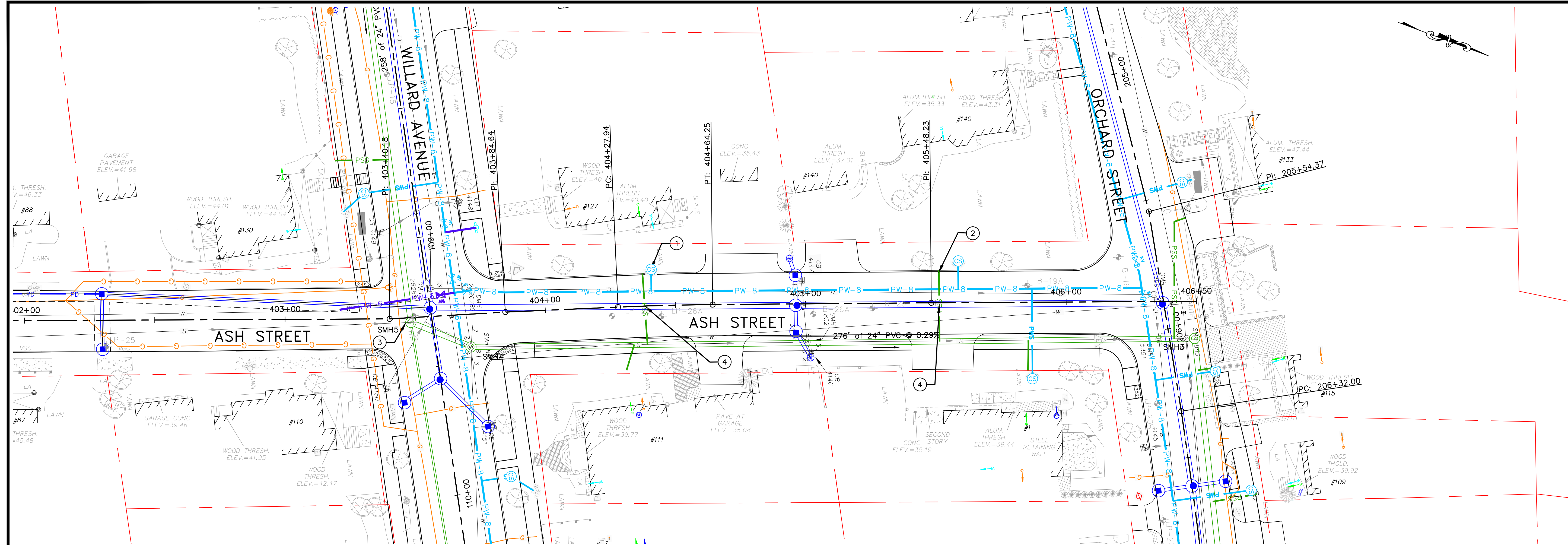
		CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223		c m a e n g i n e e r s . c o m	
		2/2/2024		Issued for Bid	
designed by: CFC/STF	date: February 2024	drawn by: WWG	checked by: PAC	approved by: PAC	revision 1
City of Portsmouth, New Hampshire Department of Public Works			Willard Ave Area Improvement Project		
Orchard St STA 203+50 to STA 207+50			Proposed Utility Plans		
drawing no. <b>U-5</b>					
sheet: 26 of 55					



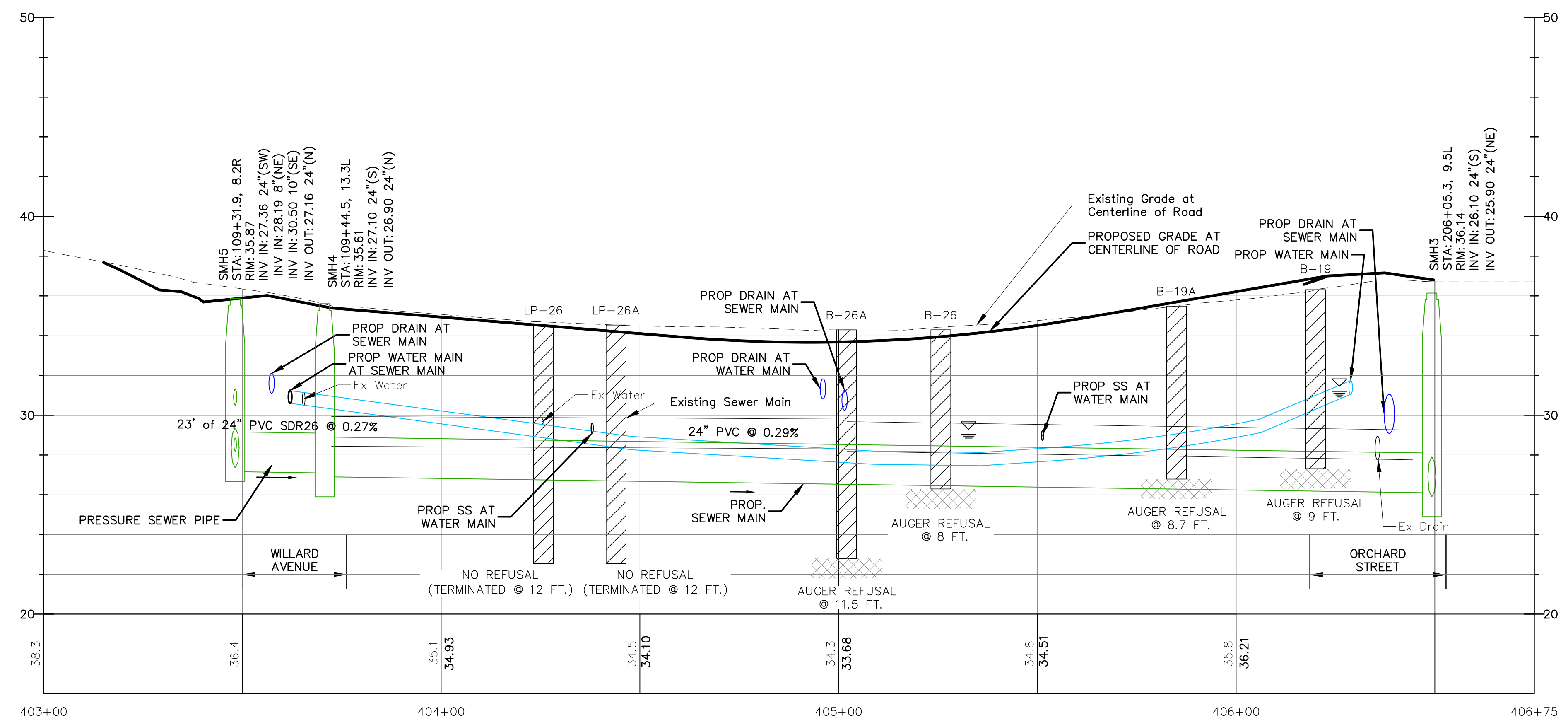
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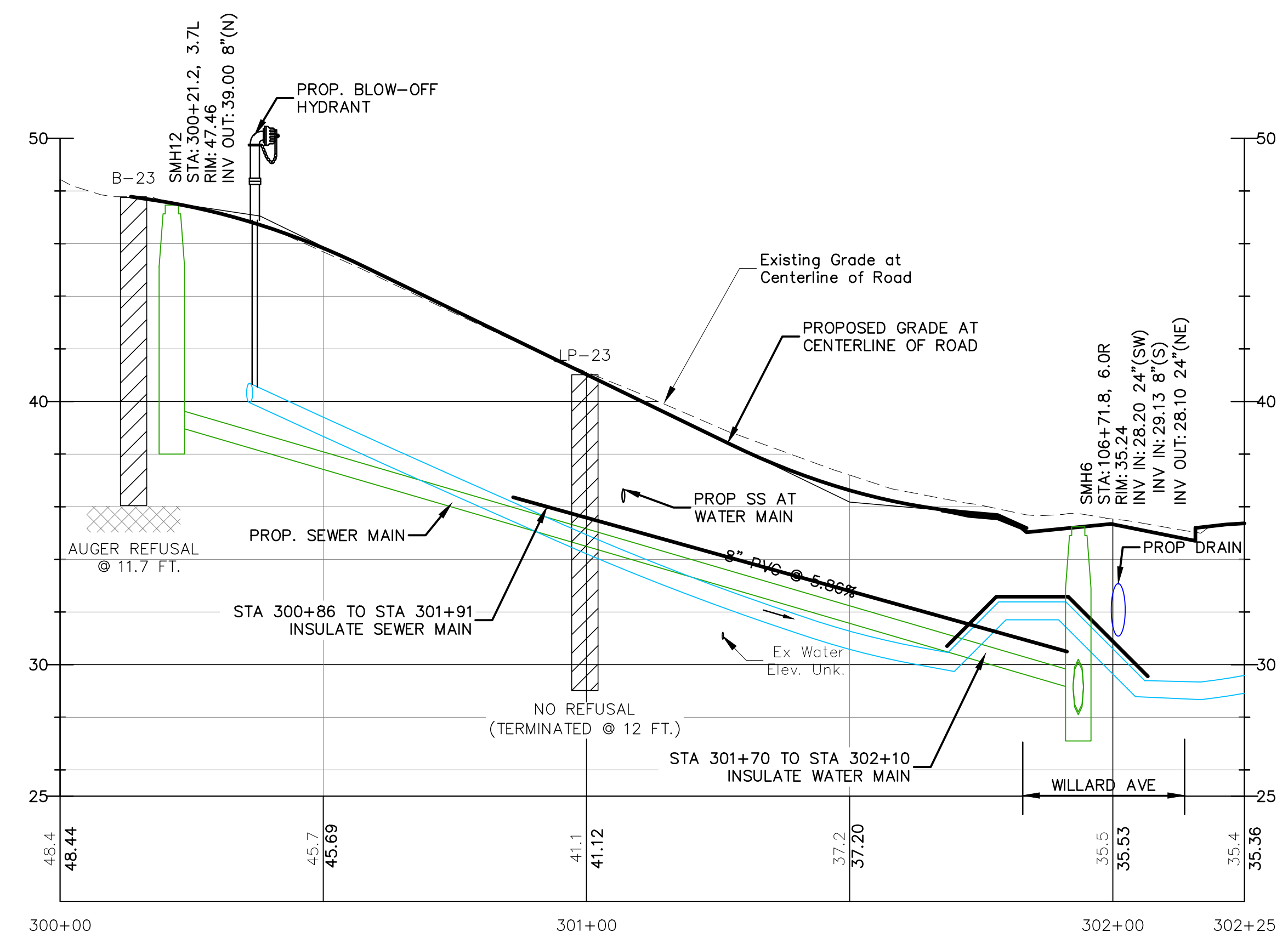
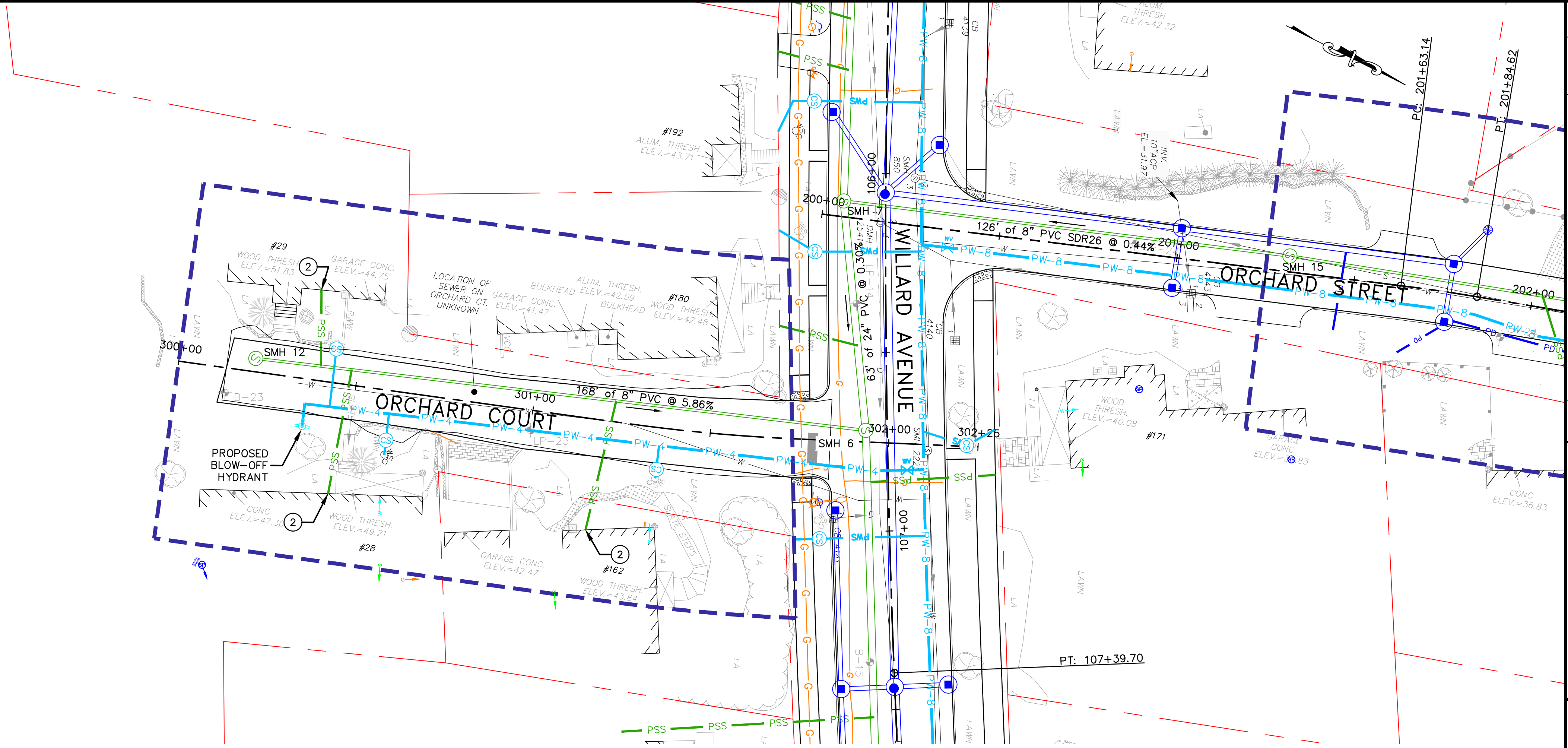
 CIVIL/ENVIRONMENTAL/STRUCTURAL		Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223	c m a e n g i n e e r s . c o m
 2/2/2024		designed by: CFC/STF drawn by: WVG checked by: PAC approved by: PAC	date: February 2024 project no: 1211 scale: 1" = 20'H/4'V 0 20' 40'
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project	
Orchard St STA 207+50 to STA 212+00		Proposed Utility Plans	
drawing no. U-6		sheet: 27 of 55	
Issued for Bid	no. 1	revision	date 2/2/2024 by PAC





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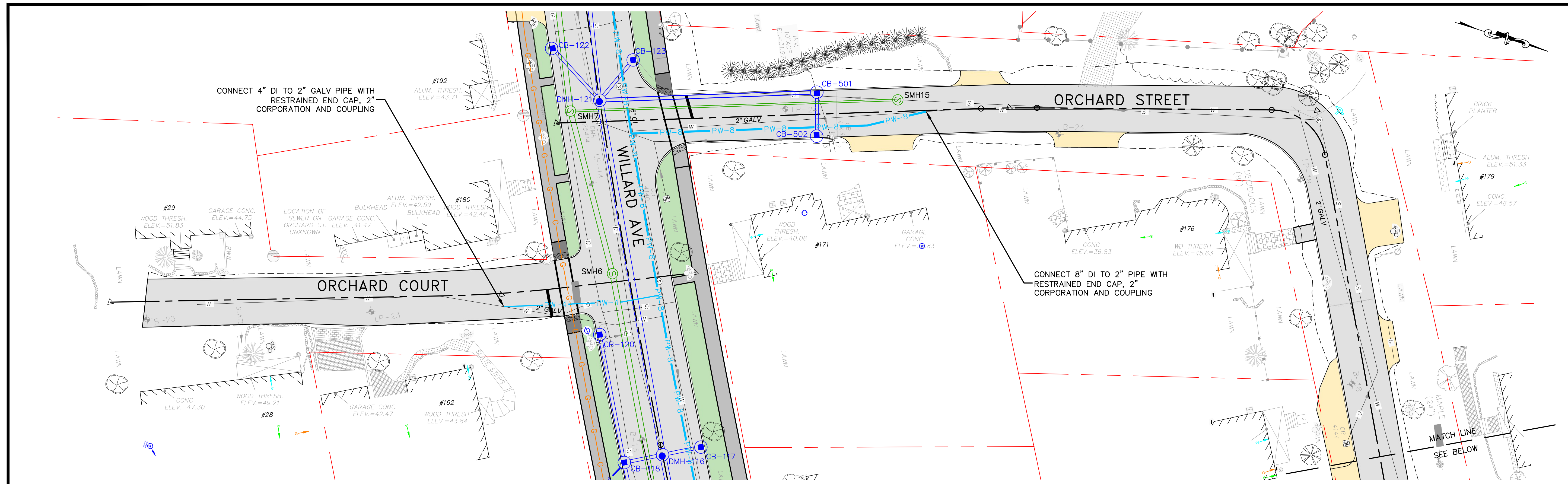


 CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m	
 2/2/2024	
date: February 2024 project no: 1211	designed by: CFC/STF drawn by: WWG checked by: PAC approved by: PAC
scale: 1" = 20'H/4'V 0 20' 40'	
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Proposed Utility Plans Ash St STA 403+00 to STA 406+75	
drawing no: <b>U-7</b>	sheet: 28 of 55
no. 1 revision	date 2/2/2024 by PAC

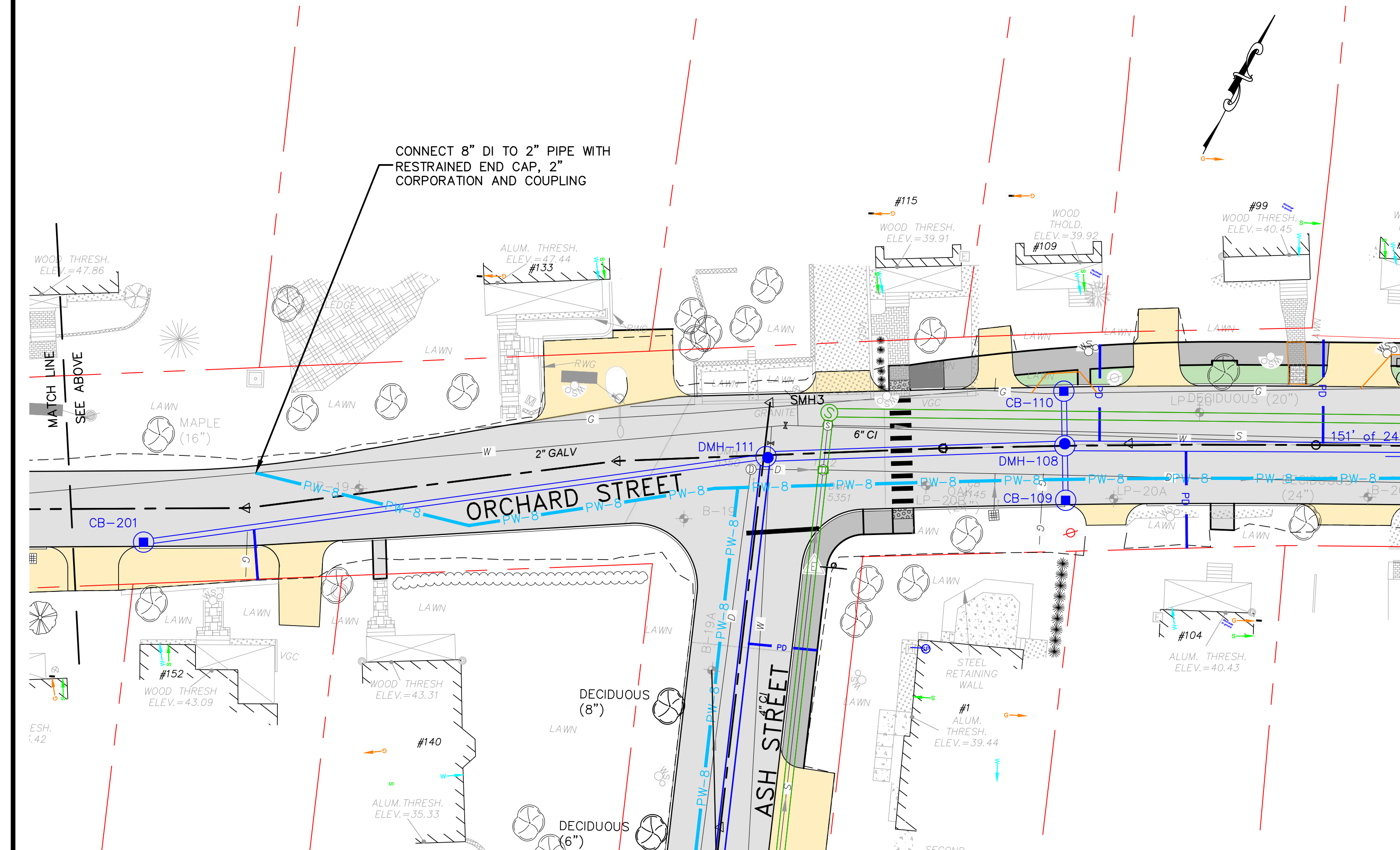


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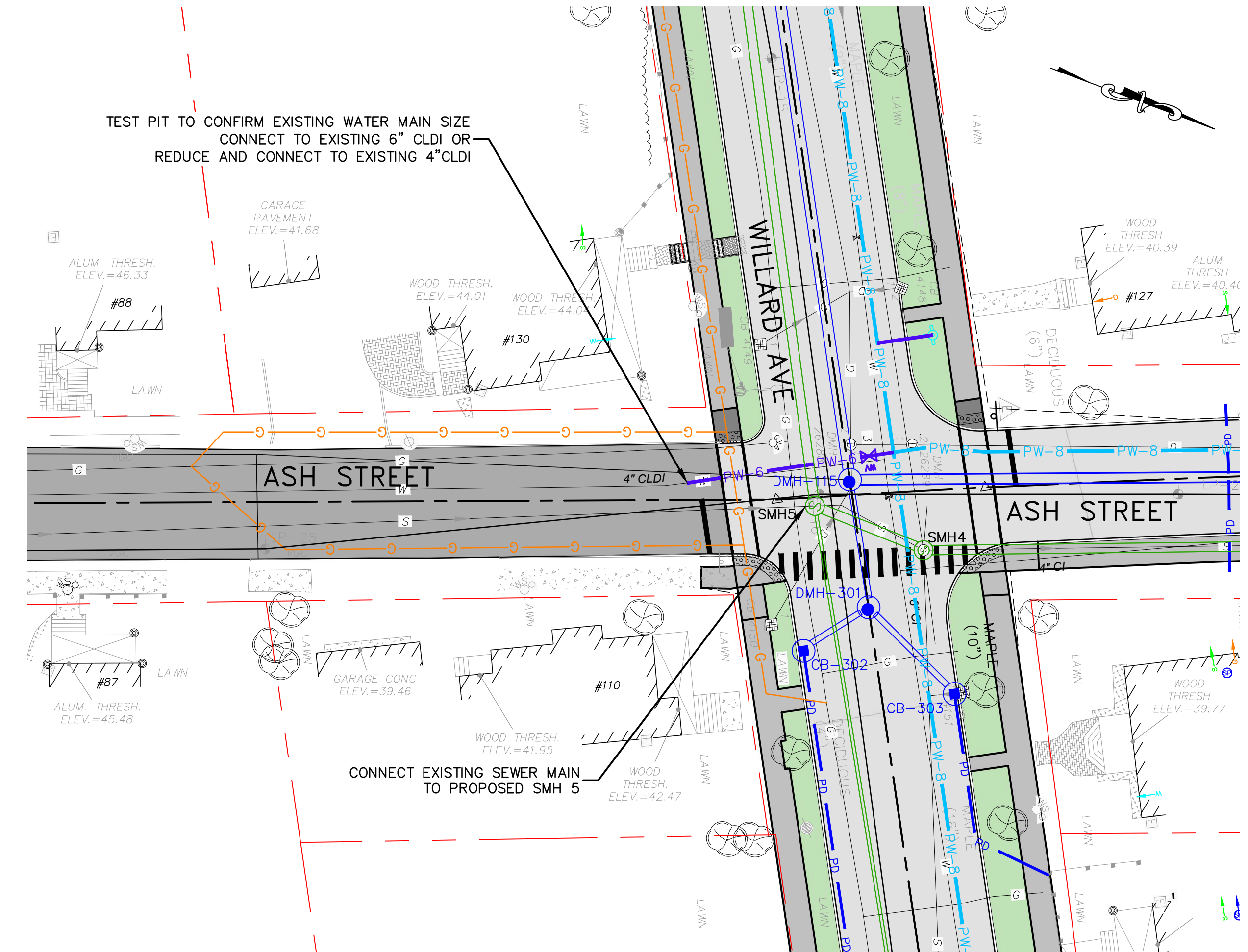
 CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH 603/431-6196 • Manchester, NH 603/627-0708 • Portland, ME 207/541-4223 c m a e n g i n e e r s . c o m		1 Issued for Bid 2/2/2024 PAC
 2/2/2024		designed by: CFC/SJF drawn by: WWG approved by: PAC checked by: PAC date: February 2024 project no: 1211
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Proposed Utility Plans Orchard Ct STA 300+00 to STA 302+00		scale: 1" = 20'H/4'V 0 20' 40'
drawing no: <b>U-8</b>		sheet: 29 of 55




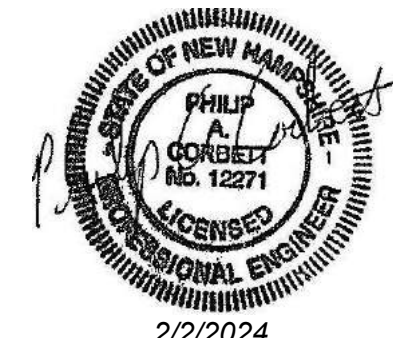
Orchard Ct & Orchard St at Willard Ave Base Bid Configuration

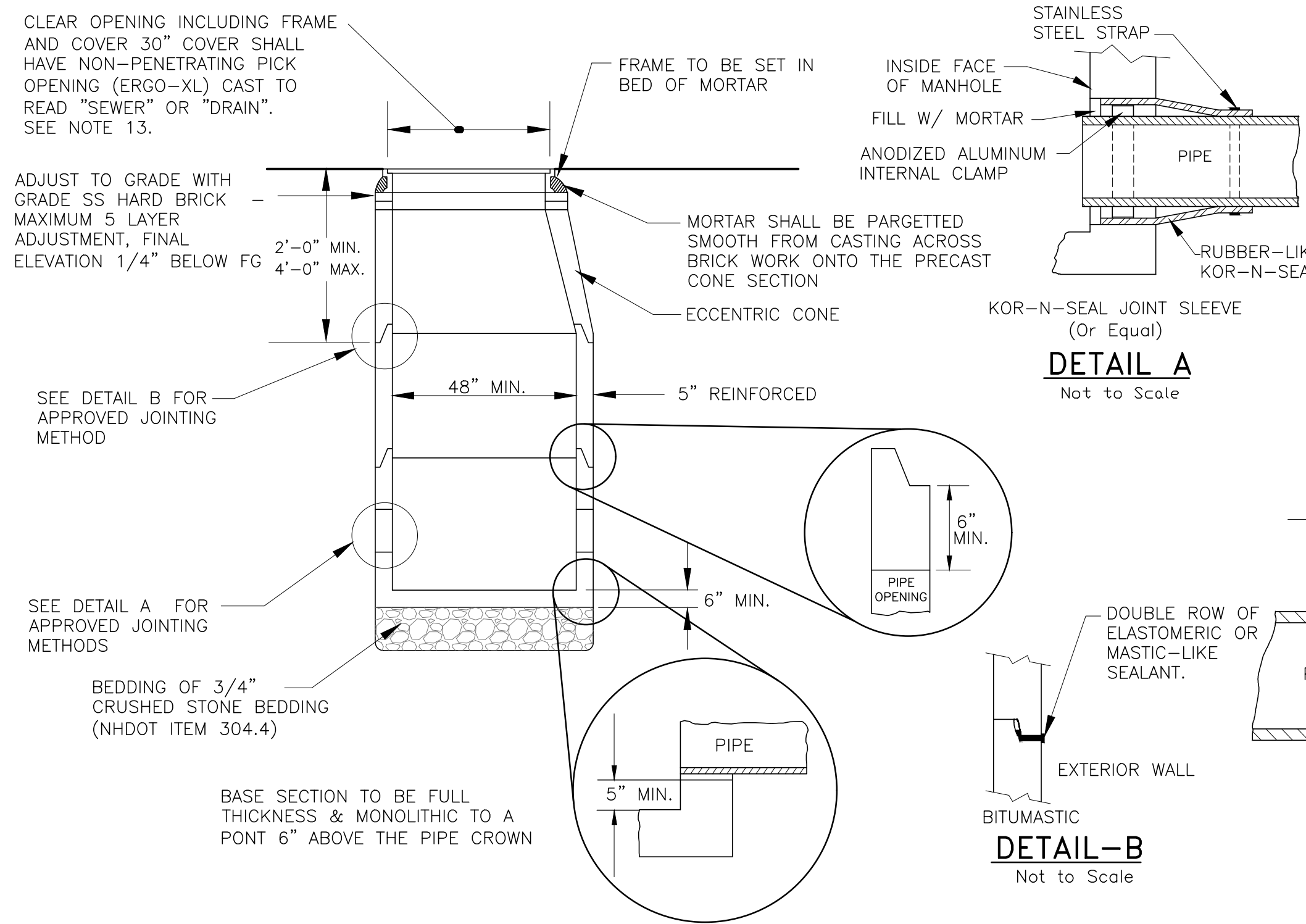


Orchard St at Ash St Base Bid Configuration



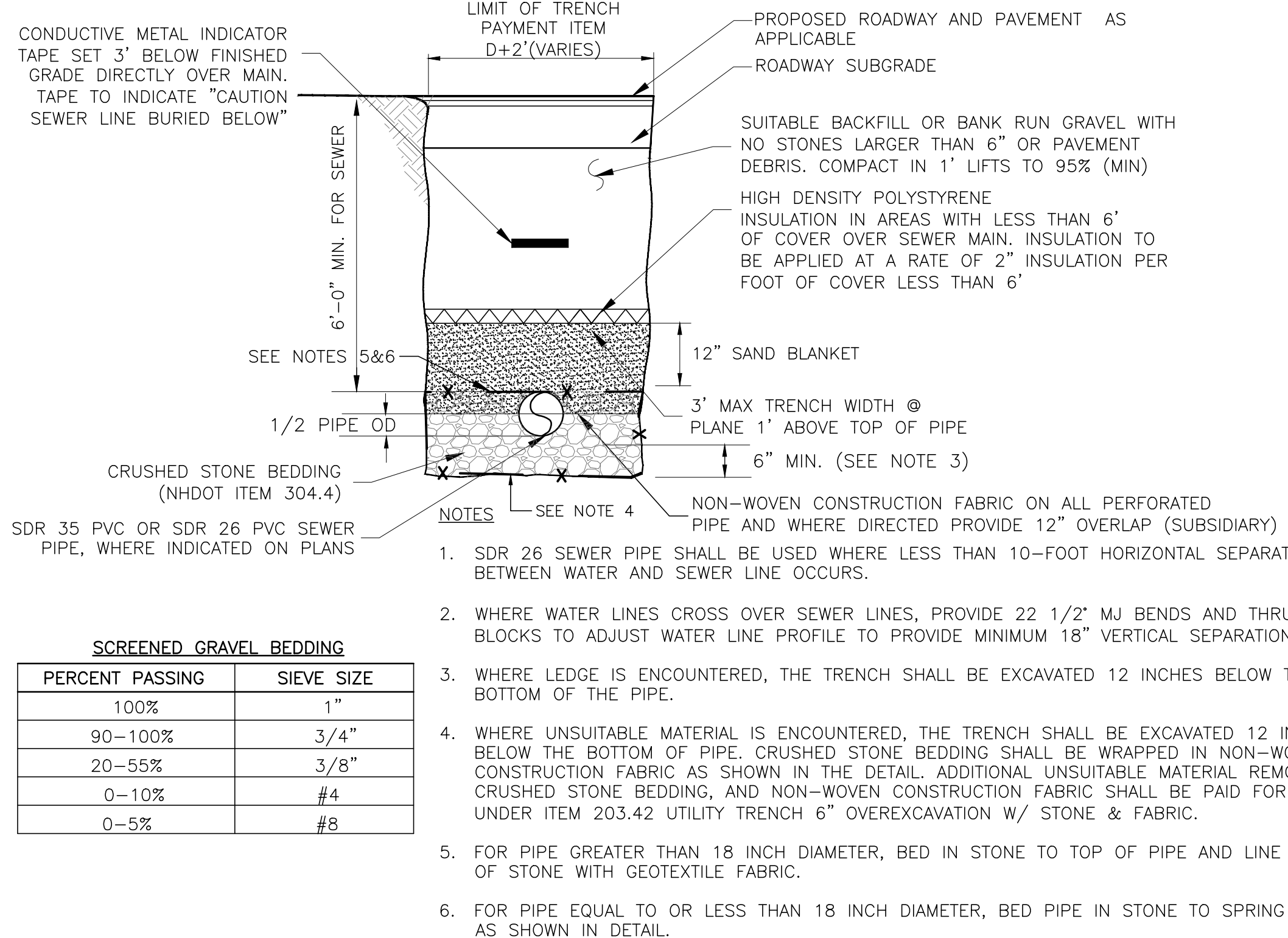
Ash St at Willard Ave Base Bid Configuration

 CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m	
 2/2/2024	
date: February 2024 designed by: CFC/STF project no: 1211 checked by: PAC	drawn by: WWG approved by: PAC scale: 1" = 20'H/4'V 0 20' 40'
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Base Bid Configurations	
drawing no. B-1 sheet: 30 of 55	
no. 1 revision	date 2/2/2024 by PAC

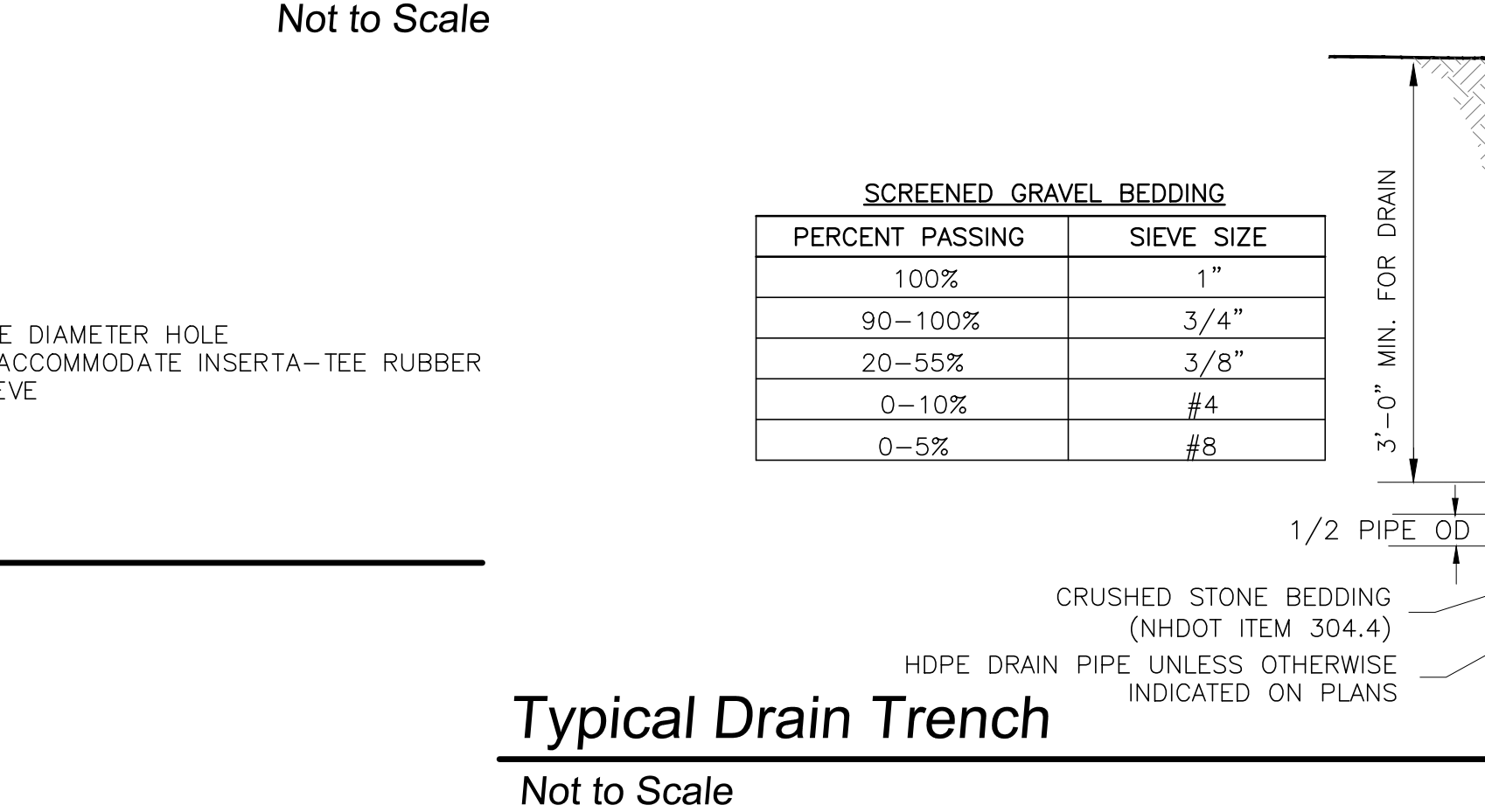


**Cast Iron Cleanout Covers**  
Not to Scale

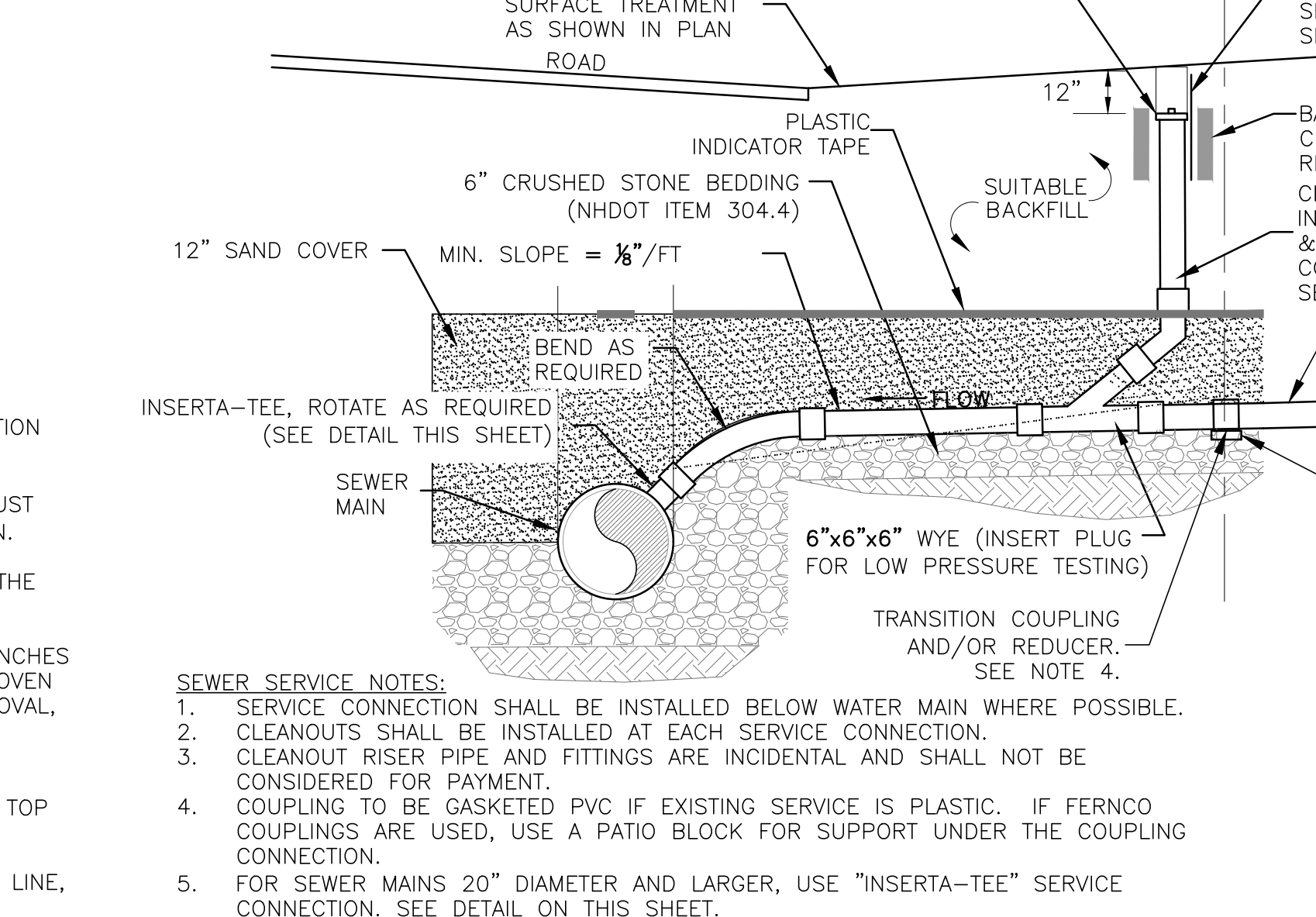
**Inserta - Tee**  
Not to Scale



**Typical Sanitary Sewer Trench**  
Not to Scale



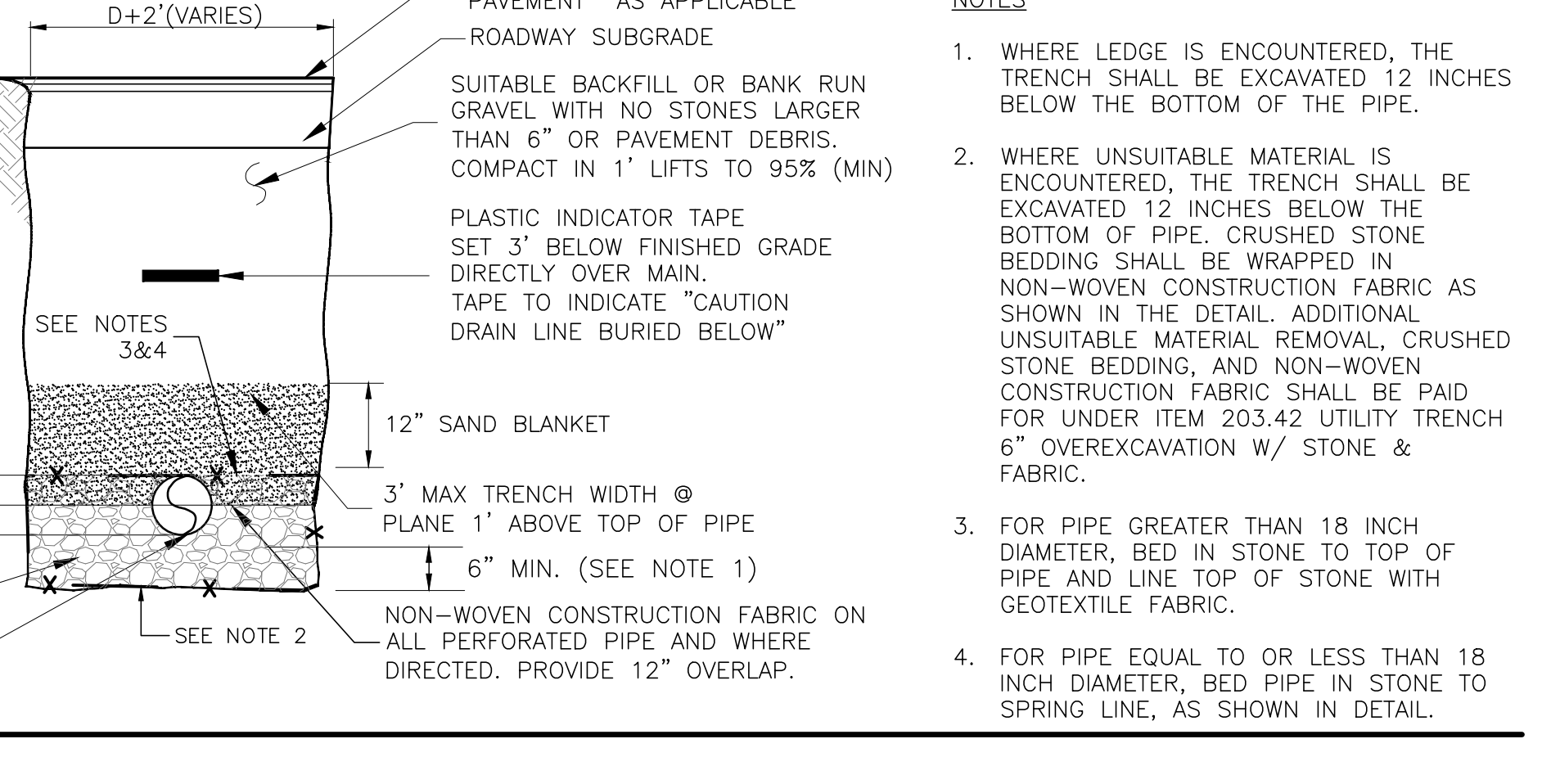
**Typical Drain Trench**  
Not to Scale



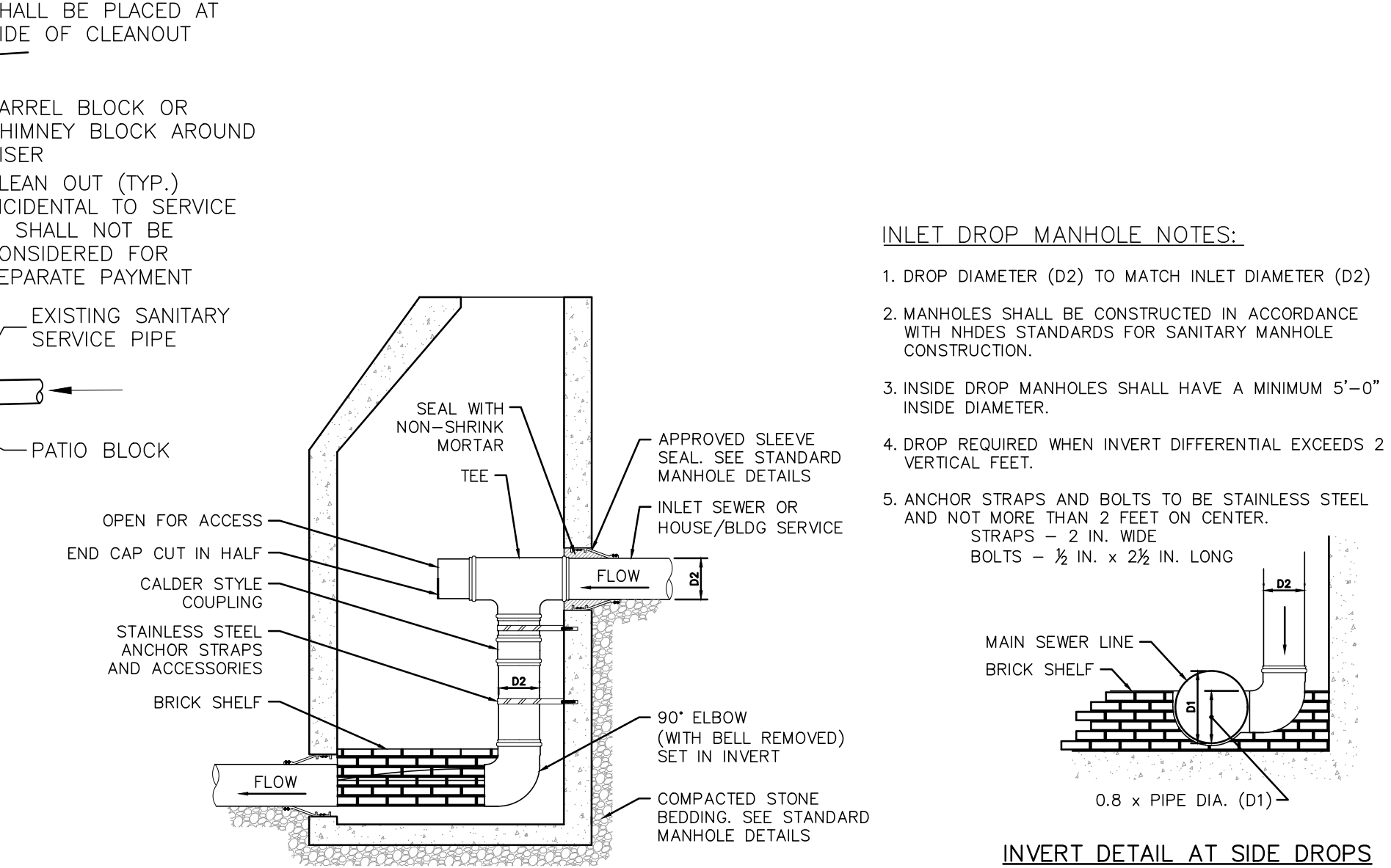
**Sewer Service Connection with Cleanout**  
Not to Scale

**NOTES:**

- ALL SPACE REQUIREMENTS AND CONFIGURATIONS, SHALL BE AS SHOWN ON THE DRAWING. MANHOLES MAY BE AN ASSEMBLY OF PRECAST SECTIONS, WITH STEEL REINFORCEMENT, WITH ADEQUATE JOINTING, OR CONCRETE CAST MONOLITHICALLY IN PLACE WITH OR WITHOUT REINFORCEMENT. IN ANY APPROVED MANHOLE, THE COMPLETE STRUCTURE SHALL BE OF SUCH MATERIAL AND QUALITY AS TO WITHSTAND LOADS OF 8 TONS (H-20 LOADING) WITHOUT FAILURE AND PREVENT LEAKAGE IN EXCESS OF ONE GALLON PER DAY PER VERTICAL FOOT OF MANHOLE, CONTINUOUSLY FOR THE LIFE OF THE STRUCTURE. A PERIOD GENERALLY IN EXCESS OF 25 YEARS IS TO BE UNDERSTOOD IN BOTH CASES.
- MANHOLE BARRELS AND CONE SECTIONS SHALL BE PRECAST CONCRETE.
- PRECAST CONCRETE BARREL SECTIONS, CONES AND BASES SHALL CONFORM TO ASTM C 478.
- LEAKAGE TEST SHALL BE PERFORMED PRIOR TO BACKFILL IN ACCORDANCE WITH THE SPECIFICATIONS.
- INVERTS AND SHELVES: MANHOLES SHALL HAVE A BRICK PAVED SHELF AND INVERT, CONSTRUCTED TO CONFORM TO THE SIZE OF PIPE AND FLOW AT CHANGES IN DIRECTION, THE INVERTS SHALL BE LAID OUT IN CURVES OF THE LONGEST RADIUS POSSIBLE TANGENT TO THE CENTER LINE OF THE SEWER PIPES. SHELVES SHALL BE CONSTRUCTED TO THE ELEVATION OF THE HIGHEST PIPE CROWN AND SLOPE TO DRAIN TO THE FLOWING THROUGH CHANNEL. UNDERLAYMENT OF INVERT AND SHELF SHALL CONSIST OF BRICK MASONRY.
- FRAMES AND COVERS: MANHOLE FRAMES AND COVERS SHALL BE OF HEAVY DUTY DESIGN AND PROVIDE A 30-INCH CLEAR OPENING. A 3-INCH (MINIMUM HEIGHT) "SEWER" OR "DRAIN" SHALL BE PLAINLY CAST INTO THE CENTER OF EACH COVER.
- BEDDING: 3/4" CRUSHED STONE BEDDING (NHDOT ITEM 304.4).
- HORIZONTAL JOINTS BETWEEN SECTIONS OF PRECAST CONCRETE BARRELS SHALL BE OF A TYPE APPROVED BY THE ENGINEER, WHICH TYPE SHALL, IN GENERAL, DEPEND FOR WATERTIGHTNESS UPON AN ELASTOMERIC OR MASTIC-LIKE GASKET APPLIED IN DOUBLE ROWS.
- PIPE TO MANHOLE JOINTS SHALL BE ONLY AS APPROVED BY THE ENGINEER AND IN GENERAL WILL DEPEND FOR WATERTIGHTNESS UPON EITHER AN APPROVED NON-SHRINKING MORTAR OR ELASTOMERIC SEALANT.
- FOR BITUMASTIC TYPE JOINTS THE AMOUNT OF SEALANT SHALL BE SUFFICIENT TO FILL AT LEAST 75% OF THE JOINT CAVITY. APPROVED BITUMASTIC SEALANTS: RAM-NEK KENT SEAL NO. 2EZ
- ALL PRECAST SECTIONS AND BASES SHALL BE COATED ON THE EXTERIOR WITH A BITUMINOUS DAMP-PROOFING COATING.
- NO MANHOLE STEPS ARE ALLOWED.
- THE CITY HAS THEIR OWN ERGO-XL COVERS. THE CONTRACTOR CAN PICK UP SEWER MANHOLE COVERS WITH NO CHARGE, BUT MUST PAY THE CITY FOR THE DRAINAGE MANHOLE COVERS.



**Typical Drop Inlet Manhole Detail**  
Not to Scale



**Sewer Drop Inlet Manhole Detail**  
Not to Scale

**INLET DROP MANHOLE NOTES:**

- DROP DIAMETER (D2) TO MATCH INLET DIAMETER (D2)
- MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH NHDES STANDARDS FOR SANITARY MANHOLE CONSTRUCTION.
- INSIDE DROP MANHOLES SHALL HAVE A MINIMUM 5'-0" INSIDE DIAMETER.
- DROP REQUIRED WHEN INVERT DIFFERENTIAL EXCEEDS 2 VERTICAL FEET.
- ANCHOR STRAPS AND BOLTS TO BE STAINLESS STEEL AND NOT MORE THAN 2 FEET ON CENTER. STRAPS - 2 IN. WIDE BOLTS - 1/2 IN. x 2 1/2 IN. LONG

**CMA ENGINEERS**  
CIVIL/ENVIRONMENTAL/STRUCTURAL

Portland, ME  
207/541-4223  
Manchester, NH  
603/627-0708  
Portsmouth, NH  
603/431-6196

**City of Portsmouth, New Hampshire**  
Department of Public Works  
Willard Ave Area  
Improvement Project  
Sewer Details

designed by: CFC/STF  
drawn by: WWG  
approved by: PAC  
checked by: PAC

date: February 2024  
project no: 1211

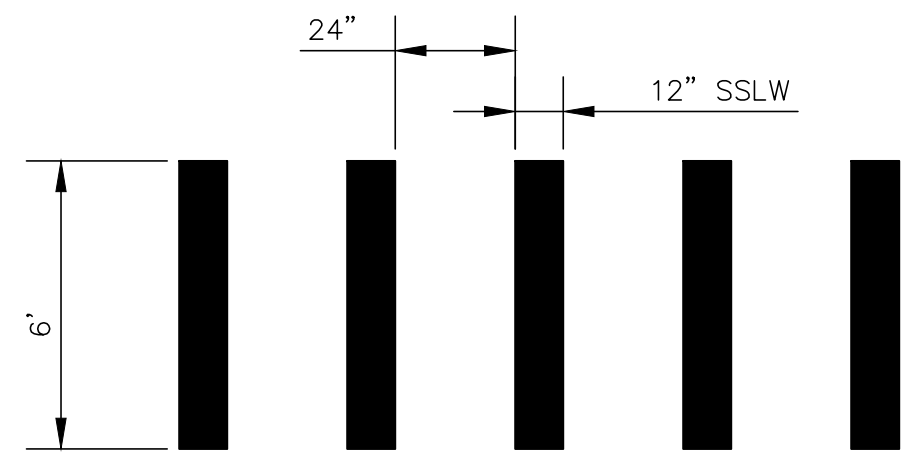
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revision: 1  
no. 1  
issued for: Bid  
date: 2/2/2024  
by: PAC

drawing no: D-1  
sheet: 31 of 55



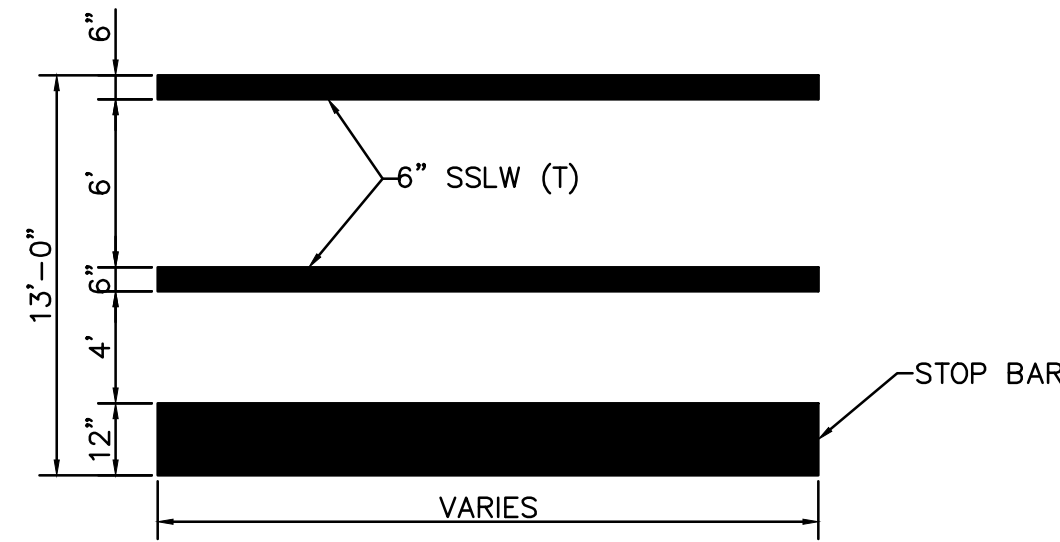




NOTE: SPACING FOR THE CONTINENTAL BLOCK MARKINGS SHALL BE UNIFORM FOR EACH INDIVIDUAL CROSSWALK BUT CAN BE MODIFIED TO ELIMINATE CROSSWALK MARKING DIRECTLY IN THE WHEEL PATH OF VEHICLES.

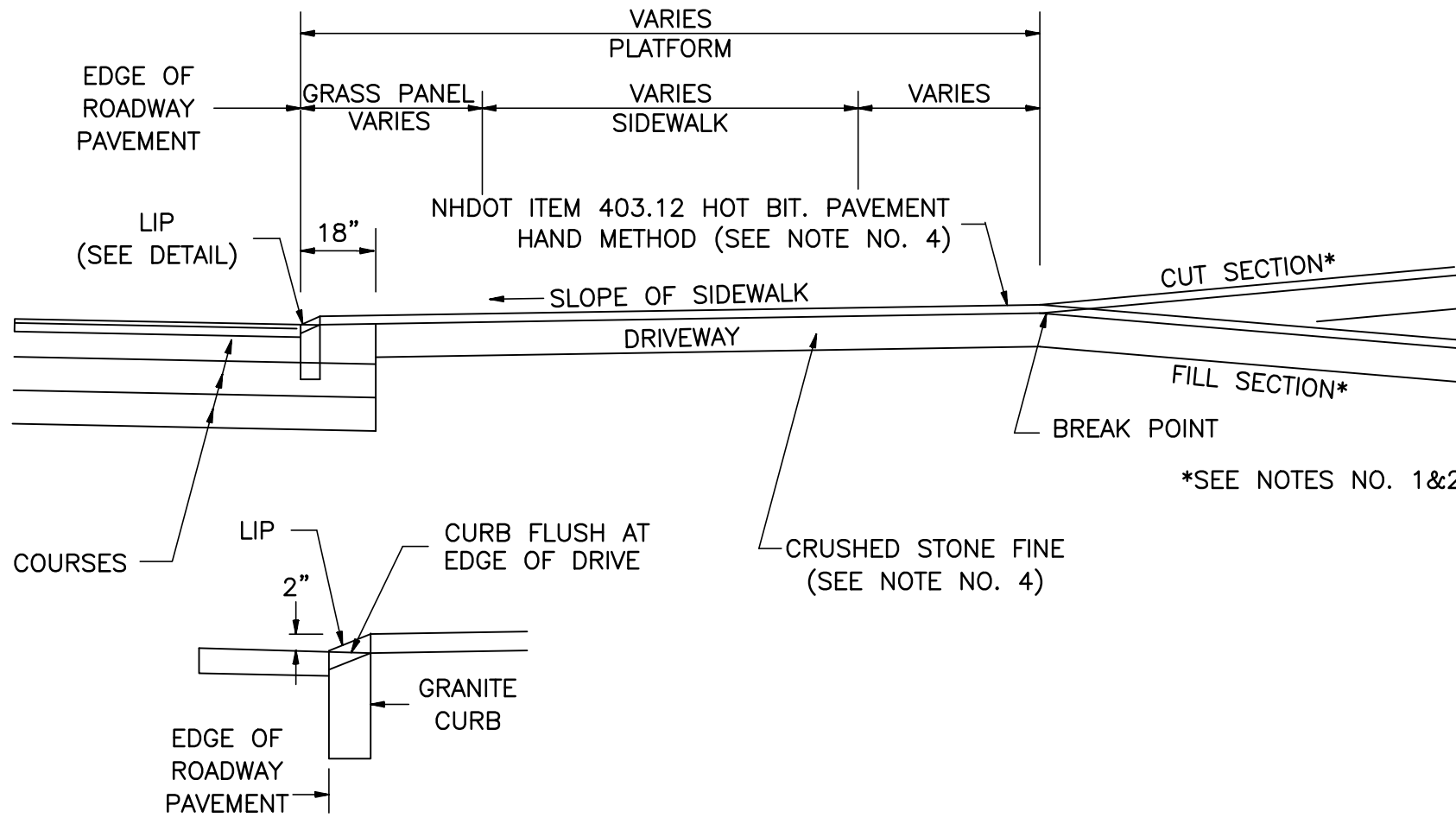
### Continental Block Marking Detail

Not to Scale



### Standard Crosswalk Detail

Not to Scale

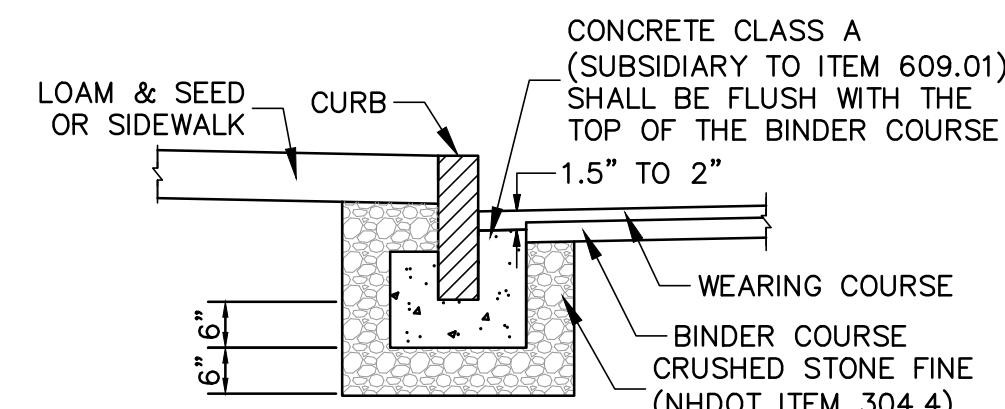


NOTES:

- GRADES OF MAJOR ENTRANCES BEYOND THE PLATFORM SHOULD NOT EXCEED 8%.
- GRADES OF OTHER DRIVES BEYOND THE PLATFORM SHOULD NOT EXCEED 15%.
- THE ALGEBRAIC DIFFERENCE BETWEEN TWO ADJACENT GRADES SHOULD NOT EXCEED 10%.
- PAVEMENT & BASE COURSE DEPTHS FOR RESIDENTIAL DRIVES SHALL BE 8" CRUSHED STONE FINE (NHDOT ITEM 304.4) WITH 3" H.B.P. (HAND METHOD) SINGLE COURSE.
- CURBING CAN BE FLARED TO FIT DRIVE RADII IF APPROPRIATE OR ENDED AS DETAILED ABOVE.
- FOR UNPAVED DRIVES, THE PAVED APRON NORMALLY ENDS AT THE RADIUS TANGENT POINT.
- SEE SHEET D-4 FOR NHDOT STANDARD RAMP DETAILS.
- THE CONTRACTOR SHALL LAYOUT PROPOSED DRIVEWAY RADIUS, FLARE, AND CURB TAPERS FOR REVIEW BY THE OWNER AND ENGINEER PRIOR TO CONSTRUCTION.

### Typical Driveway Section

Not to Scale

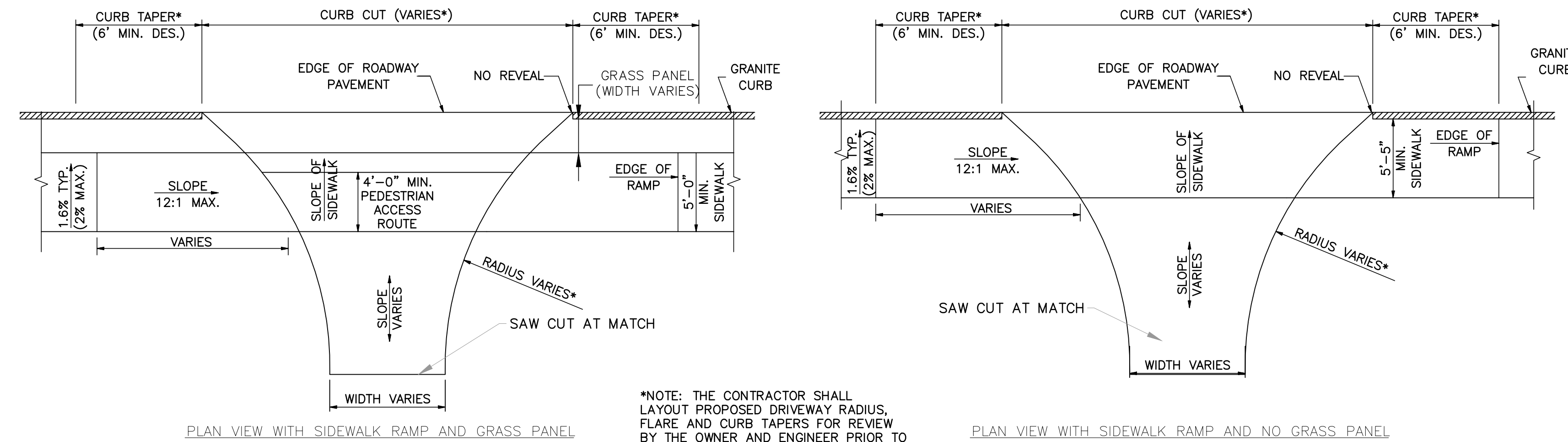
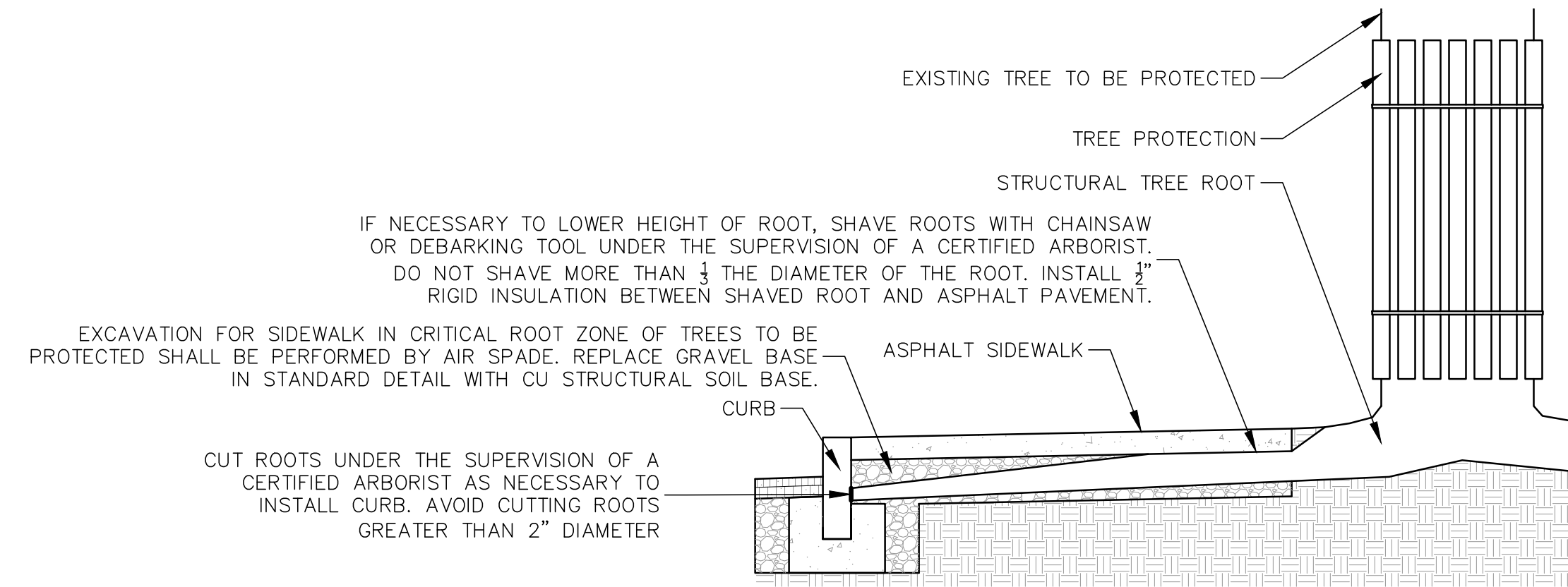


### Granite Curb w/ Concrete Backing

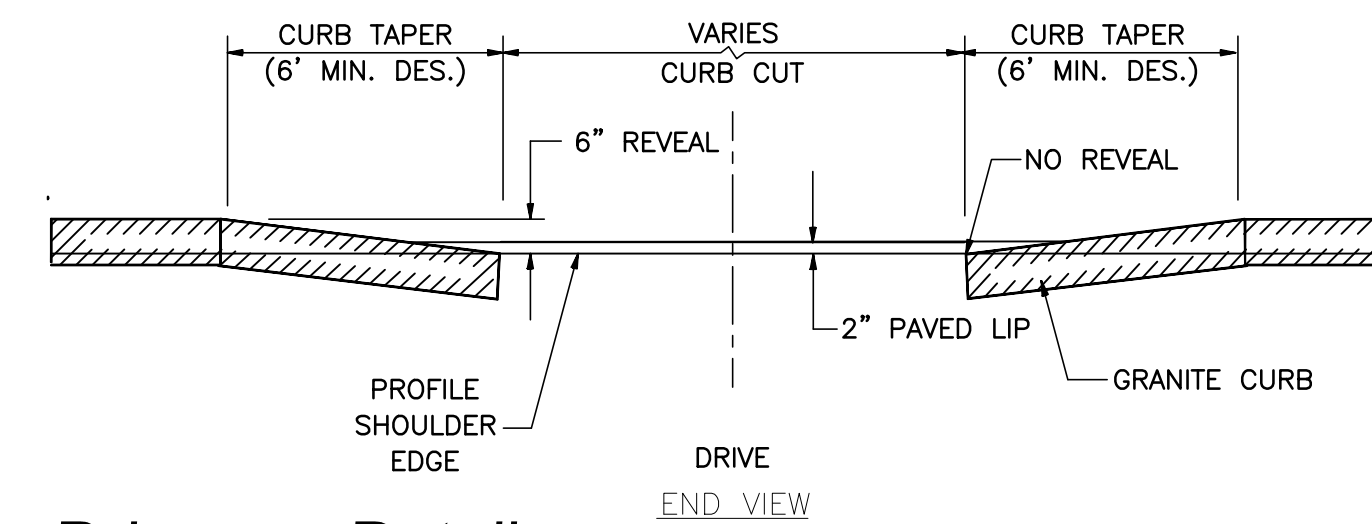
Not to Scale

### Sidewalk at Existing Tree to be Protected

Not to Scale



\*NOTE: THE CONTRACTOR SHALL LAYOUT PROPOSED DRIVEWAY RADIUS, FLARE AND CURB TAPERS FOR REVIEW BY THE OWNER AND ENGINEER PRIOR TO CONSTRUCTION.



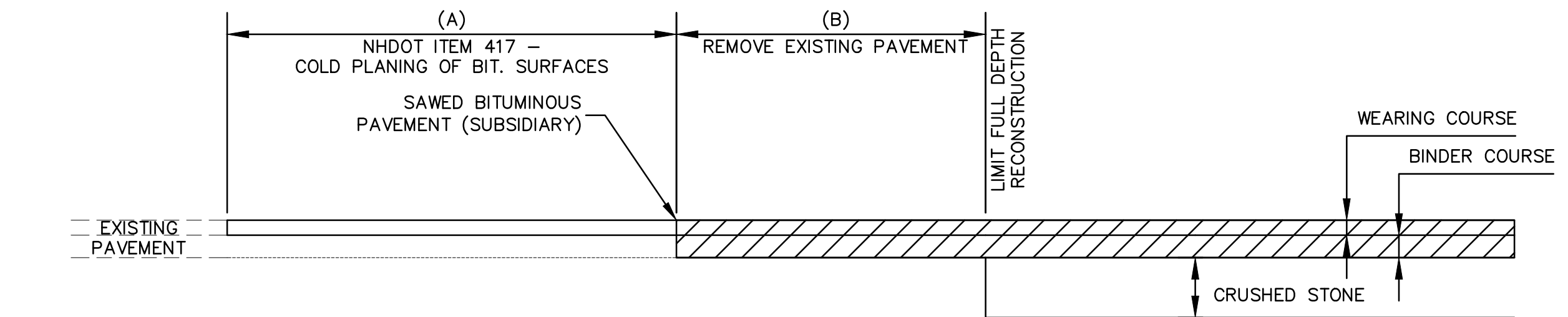
### Driveway Detail

Not to Scale

ITEM #	IDENT #	SIGN SIZE		TEXT	TEXT DIMENSIONS			SHIELD SIZE (INCH)	ARROW (INCH)	NUMERAL (INCH)	# SIGNS REQ'D	SIGN AREA (SQ. FT)		POSTS PER SIGN				REMARKS
		WIDTH (INCH)	HEIGHT (INCH)		LETTER HEIGHT (INCH)							NOM. AREA	TOTAL AREA	BREAKAWAY STEEL I-BEAM	CONCRETE BASE	4" O.D. ALUMINUM U-CHANNEL GALV.		
					UC	LC	CAPS											
615.0301	R1-1	36	36	STOP			12C				3	9.00	27.00				1	WHITE/RED
615.0301	D3-1	42	12	WILLARD AVE							1	3.50	3.50				1	GREEN/WHITE

### Sign Text Layout

Not to Scale



ROADWAY	(A)	(B)
WILLARD AVE (END)	5'	5'

NOTES:

- CRUSHED STONE SHIM MAY BE NEEDED IN PAVEMENT REMOVAL AREAS.
- SEE TYPICALS FOR WEARING AND BINDER DEPTHS.

### Pavement and Base Course Transitions

Not to Scale

designed by: CFC/STF

drawn by: WWG

checked by: PAC

approved by: PAC

date: February 2024

project no: 1211

scale: 1" = 10'

0 10' 20'

City of Portsmouth, New Hampshire  
Department of Public Works

Willard Ave Area  
Improvement Project

Roadway Details

1

Issued for Bid

2/2/2024

PAC

revision

date

by

1

Issued for Bid

2/2/2024

PAC

revision

date

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Issued for Bid

2/2/2024

PAC

revision

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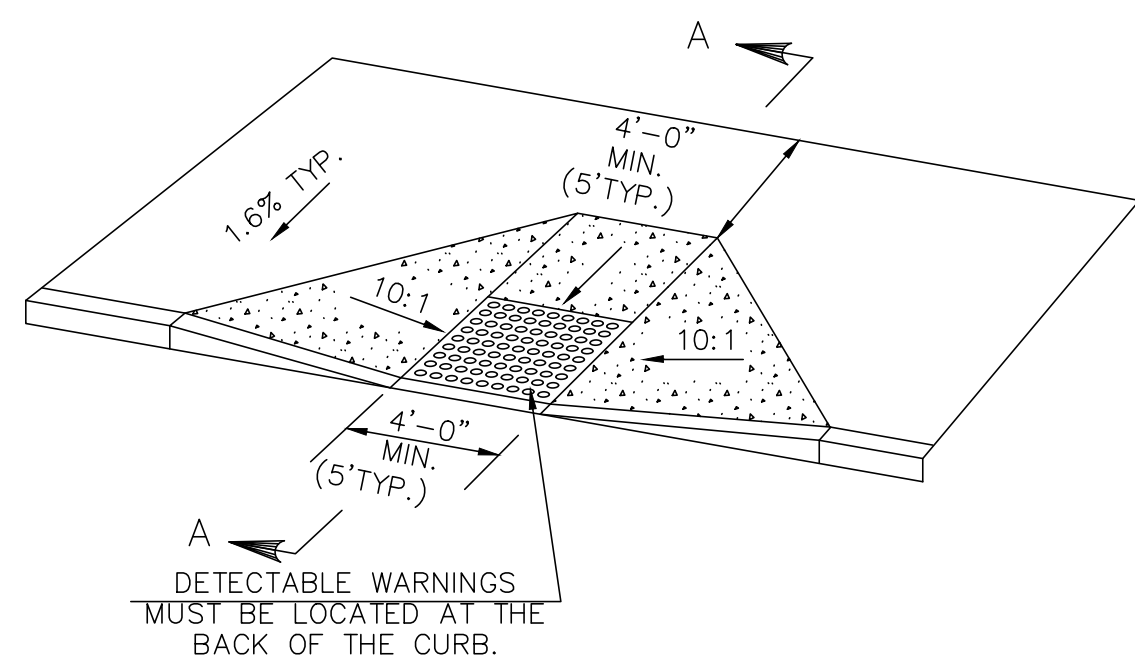
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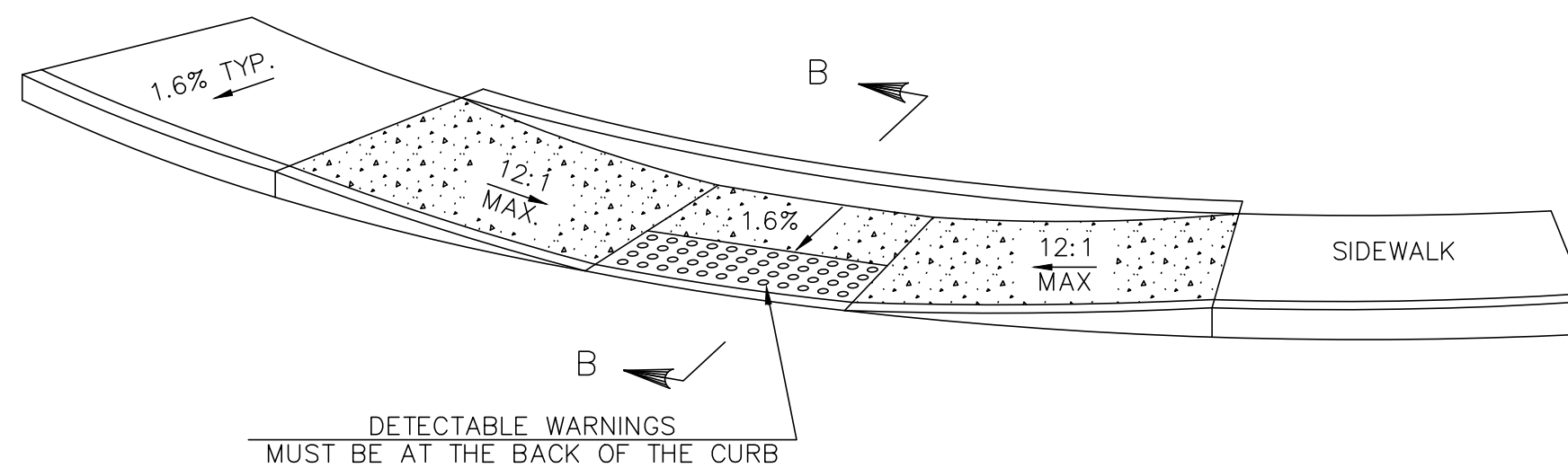
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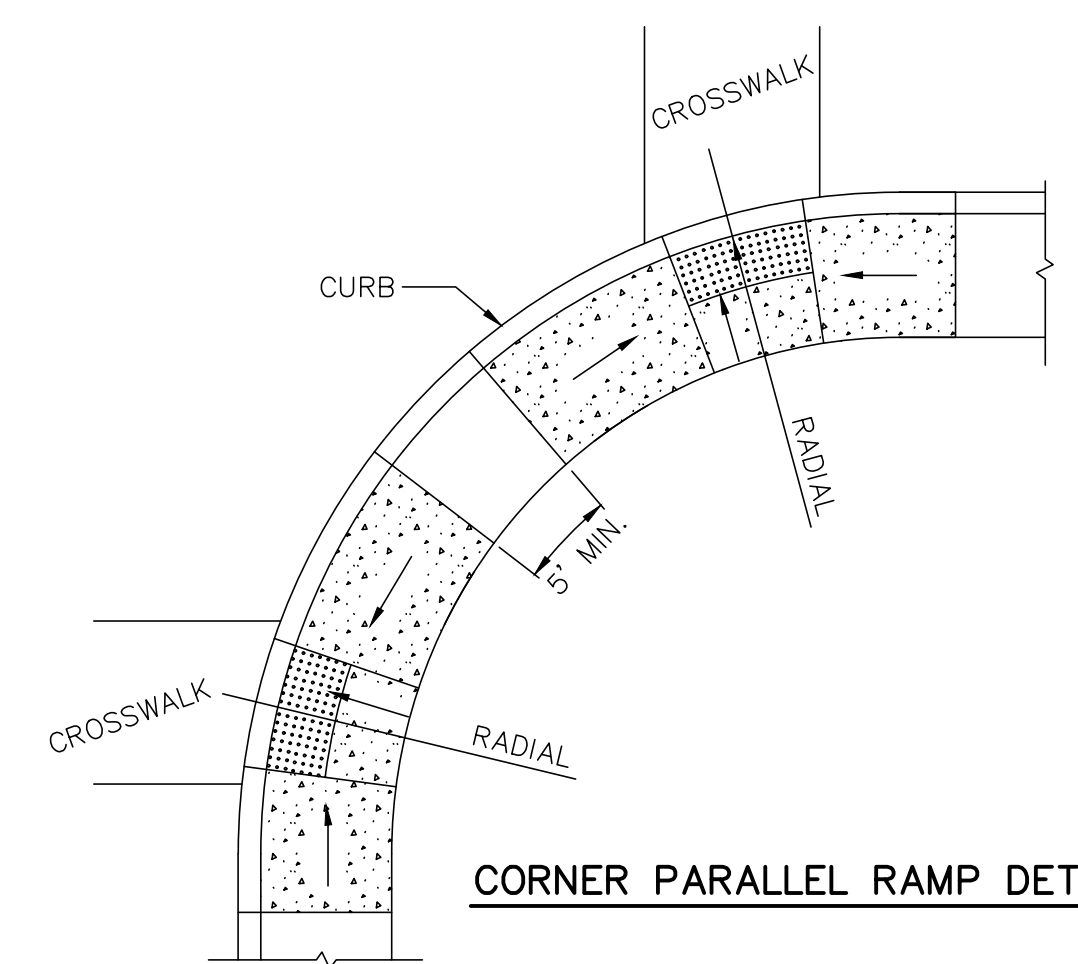
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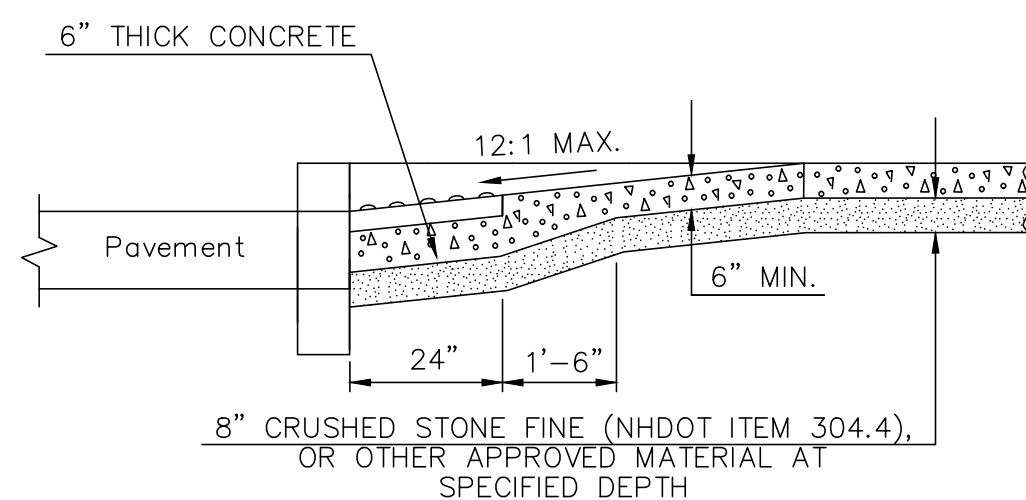
**PERPENDICULAR CURB RAMP DETAIL**



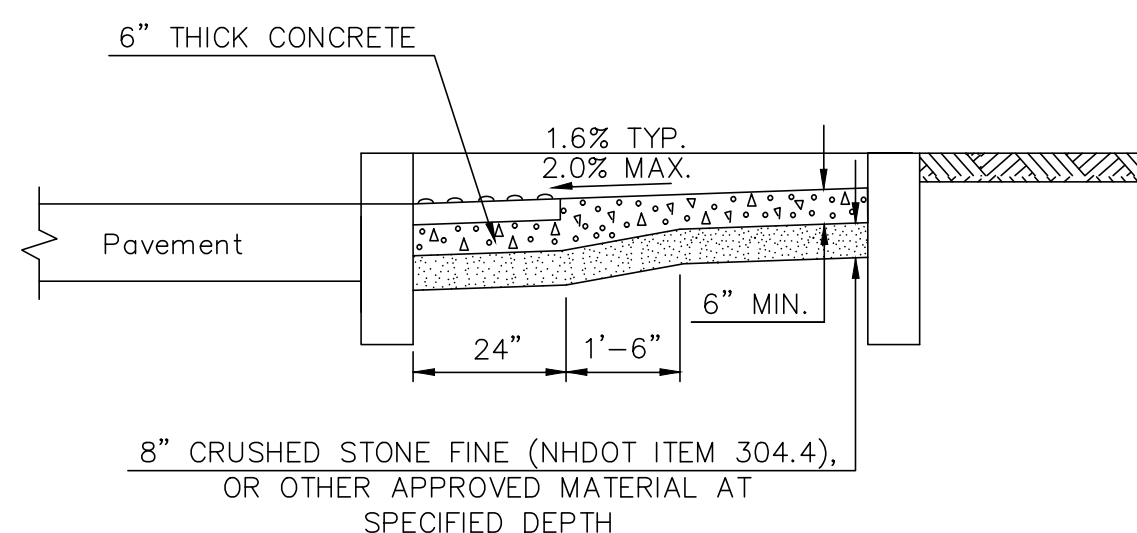
**PARALLEL CURB RAMP DETAIL**



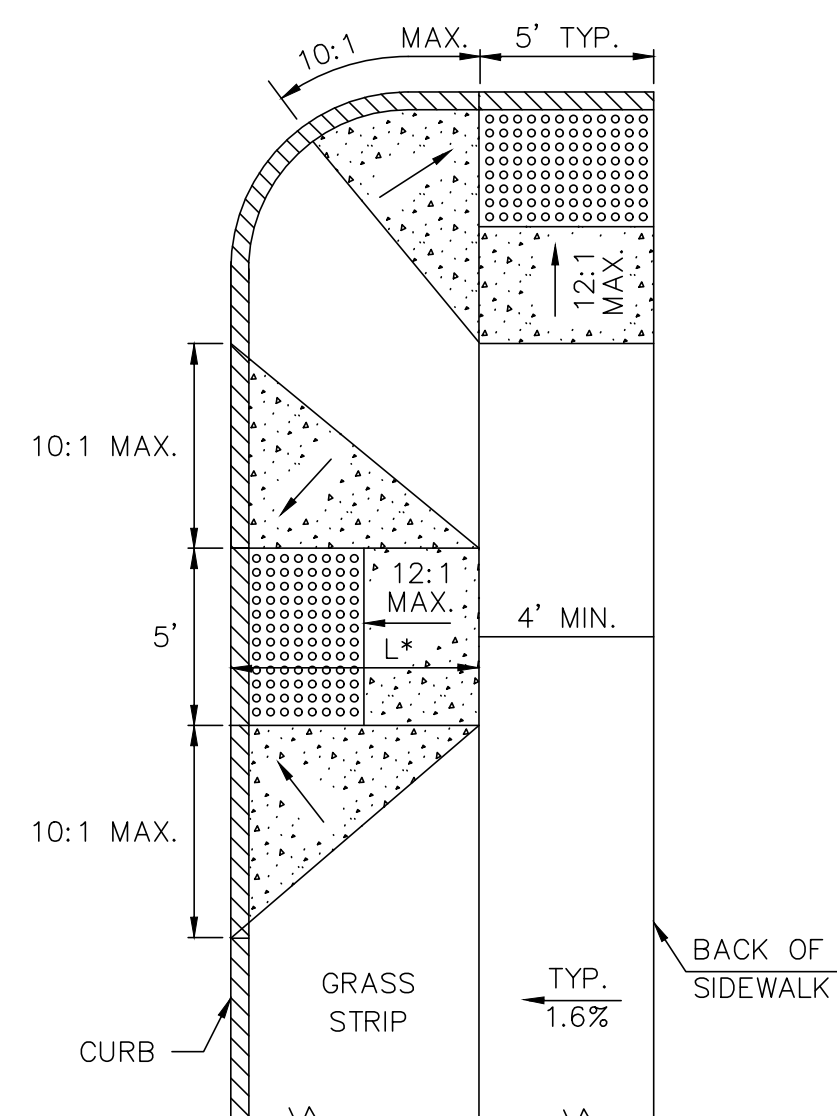
**CORNER PARALLEL RAMP DETAIL**



**SECTION A-A**



**SECTION B-B**



**PERPENDICULAR RAMP WITH GRASS PANEL**

\* LENGTH OF RAMP VARIES WITH SLOPE & WIDTH OF GRASS PANEL

**THE ORDER OF PREFERENCE FOR LOCATION OF CORNER RAMPS:**

1. TWO SEPARATE RAMPS LOCATED ON TANGENT SIDEWALK AREA IMMEDIATELY OUTSIDE OF CORNER RADIUS.
2. TWO SEPARATE RAMPS SEPARATED BY 5' MINIMUM AS SHOWN ABOVE.
3. SINGLE RAMP SERVING TWO CROSSWALKS.

**GENERAL NOTES**

1. THE MAXIMUM RUNNING SLOPE OF ANY SIDEWALK CURB RAMP IS 12:1. THE MAXIMUM CROSS SLOPE IS 2%. THE SLOPE OF THE LANDING SHALL NOT EXCEED 2% IN ANY DIRECTION. RAMP RUNNING SLOPE EXCEPTION: A GREATER THAN 8.33% RAMP RUNNING GRADE IS ALLOWED WHERE THE ROADWAY AND THE SIDEWALK(S) ARE PARALLEL AND VERY CLOSE TOGETHER, WITH THE SAME GRADE, AND USING A GRADE OF 8.33% WOULD RESULT IN A RAMP LENGTH LONGER THAN 15'. IN THOSE CIRCUMSTANCES USE A MAXIMUM RAMP LENGTH OF 15' AND THE ALLOWABLE RUNNING SLOPE OF THE RAMP(S) IS GREATER THAN 8.33%
2. TRANSITIONS SHALL BE FLUSH AND FREE OF ABRUPT CHANGES. ROADWAY SHOULDER SLOPES ADJOINING SIDEWALK CURB RAMPS SHALL BE A MAXIMUM OF 5% (FULL WIDTH) FOR A DISTANCE OF 2 FT. FROM THE ROADWAY CURB LINE.
3. INTERCEPT DRAINAGE ALONG THE CURB IN ADVANCE OF SIDEWALK CURB RAMPS OR LANDINGS. CATCH BASINS, MANHOLES, ETC. SHALL NOT BE LOCATED IN, OR AT THE BASE OF, SIDEWALK CURB RAMPS OR LANDINGS.
4. THE BOTTOM OF THE SIDEWALK CURB RAMP OR LANDING, EXCLUSIVE OF THE FLARED SIDES, SHALL BE WHOLLY CONTAINED WITHIN THE CROSSWALK MARKINGS.
5. THE SURFACE OF A PERPENDICULAR SIDEWALK CURB RAMP OR THE LANDING OF A PARALLEL SIDEWALK CURB RAMP SHALL CONTRAST VISUALLY WITH THE ADJOINING SIDEWALK SURFACE, EITHER ASPHALT/LIGHT-COLORED CONCRETE OR LIGHT-COLORED CONCRETE/DARK-STAINED CONCRETE. THE CONCRETE SURFACE SHALL BE SLIP RESISTANT.
6. DETECTABLE WARNING PANELS SHALL BE THE FULL WIDTH OF THE LANDING, BLENDED TRANSITION, OR CURB RAMP THEY ARE A PART OF AND SHALL BE A MINIMUM OF 2 FEET IN DEPTH. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED PERPENDICULAR TO THE GRADE BREAK BETWEEN THE RAMP, BLENDED TRANSITION, OR LANDING AND THE STREET.

**TRANSITION RAMPS:**

BLENDED TRANSITIONS HAVE A RUNNING SLOPE GREATER THAN 2% BUT LESS THAN 5%. CURB RAMPS HAVE A RUNNING SLOPE OF 5% MIN. TO 8.33% MAX. SIDEWALK, BLENDED TRANSITIONS, AND CURB RAMPS HAVE A MAX. CROSS SLOPE OF 2%.

ALL GRADE BREAKS BETWEEN LANDINGS, RAMPS, AND BLENDED TRANSITIONS SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL.

IF IT IS NECESSARY TO USE SIDEWALK WIDTHS 5'-0" OR LESS, PROVIDE A WIDENED AREA A MINIMUM OF 5'-0" WIDE BY 5'-0" LONG SPACED AT INTERVALS OF 200' MAXIMUM TO ALLOW FOR USERS TO PASS EACH OTHER.

PROVIDE DETECTABLE WARNING SURFACES ANYTIME THAT A CURB RAMP, BLENDED TRANSITION, OR LANDING CONNECTS TO A STREET. PLACEMENT FOR DETECTABLE WARNING SURFACES ARE AS FOLLOWS:

**PERPENDICULAR CURB RAMPS:**

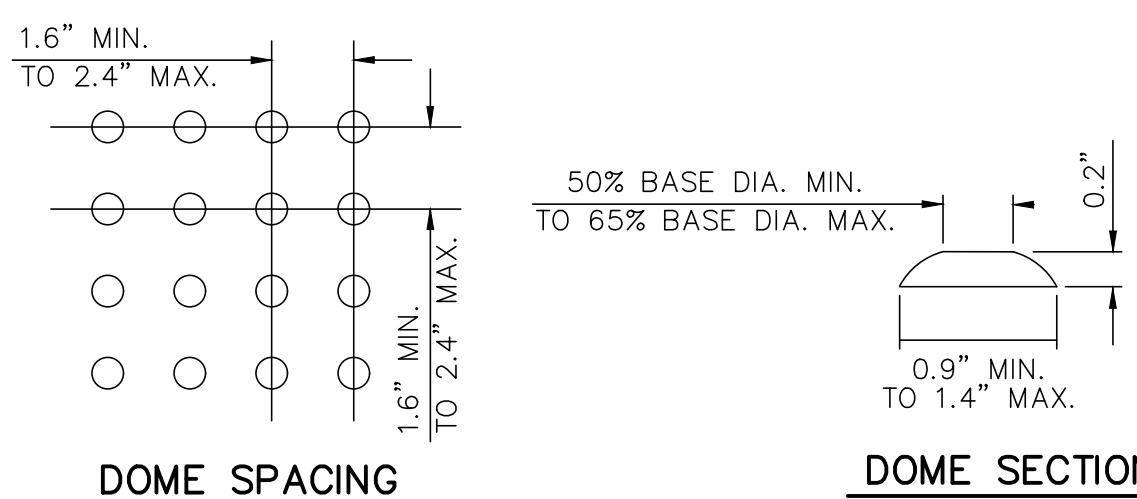
WHERE BOTH ENDS OF THE BOTTOM GRADE ARE LESS THAN 5'-0" FROM THE BACK OF THE CURB, LOCATE THE DETECTABLE WARNING PANELS ON THE RAMP SURFACE AT THE BOTTOM OF THE RAMP. WHERE EITHER END OF THE BOTTOM GRADE IS GREATER THAN 5'-0" FROM THE BACK OF THE CURB, LOCATE THE DETECTABLE WARNINGS AT THE BOTTOM OF THE LANDING.

**PARALLEL CURB RAMPS:**

LOCATE THE DETECTABLE WARNING SURFACES AT THE BACK OF THE CURB ALONG THE EDGE OF THE LANDING.

**FOR BLENDED TRANSITIONS AND LANDINGS:**

LOCATE THE DETECTABLE WARNING SURFACES AT THE BACK OF THE CURB.

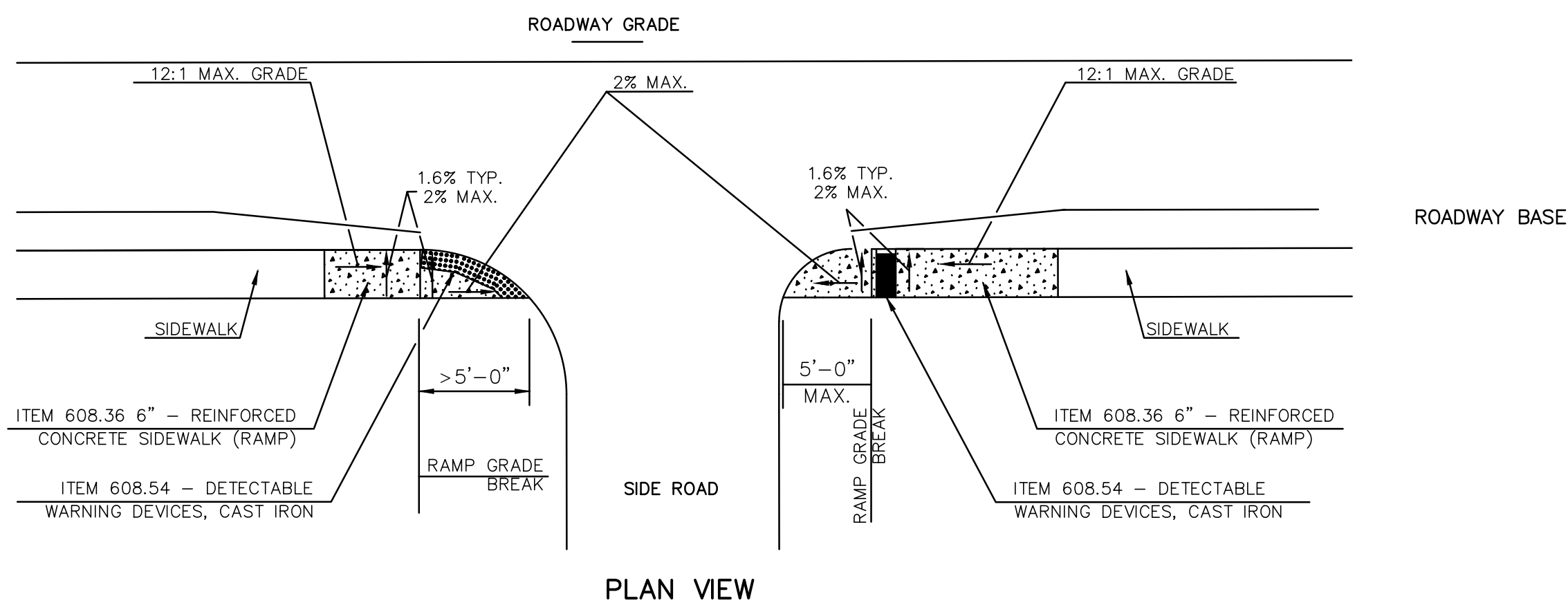


**DOME SPACING**

**DOME SECTION**

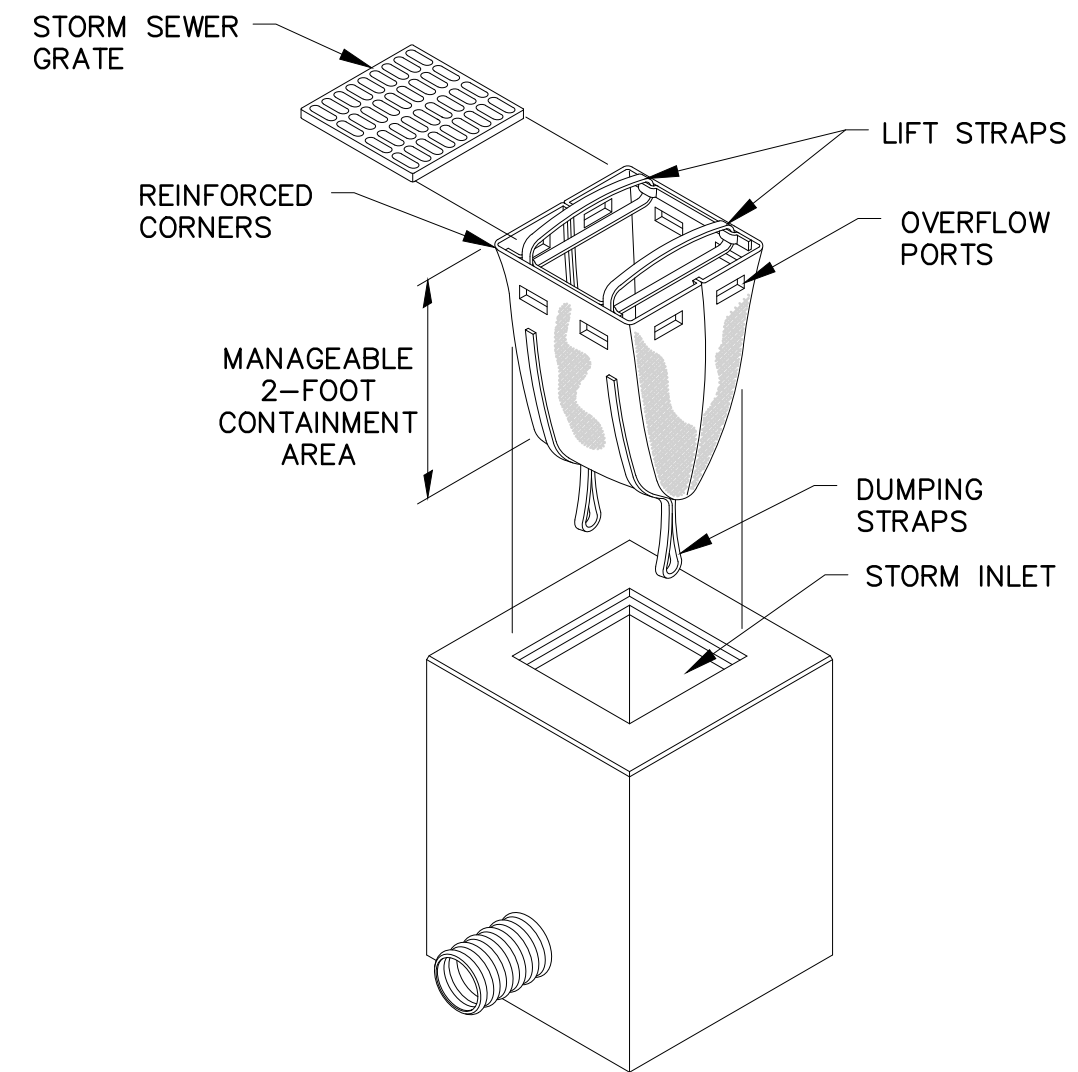
**Sidewalk & Curb Ramp Details**

Not to Scale



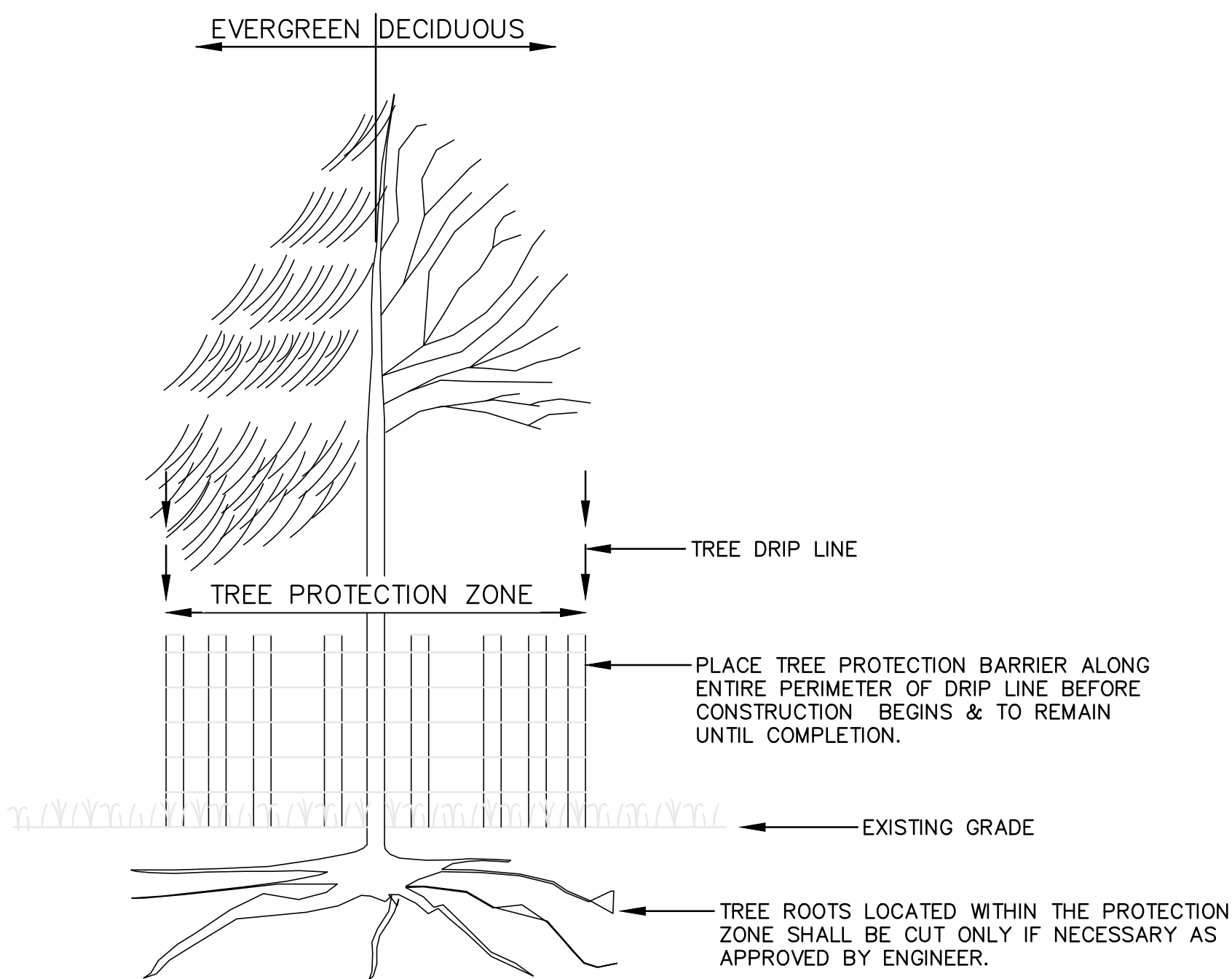
**PLAN VIEW**

designed by:	CFC/STF	drawn by:	WWG	approved by:	PAC	date:	February 2024	project no.:	1211	checked by:	PAC	scale:	0 10' 20'	Scale: 1" = 10'
<p>City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Sidewalk Details</p>														
drawing no. D-4														
sheet: 34 of 55														
<p>no. 1 revision 1 Issued for Bid 2/2/2024 date 2/2/2024 by PAC</p>														
<p>CMA ENGINEERS Civil/Environmental/Structural Portsmouth, NH 603/431-6196 Manchester, NH 603/627-0708 Portland, ME 207/641-4223 c m a e n g i n e e r s . c o m</p>														
<p>PHILIP A. CORBETT GOV. 1271 LICENSED PROFESSIONAL ENGINEER 2/2/2024</p>														



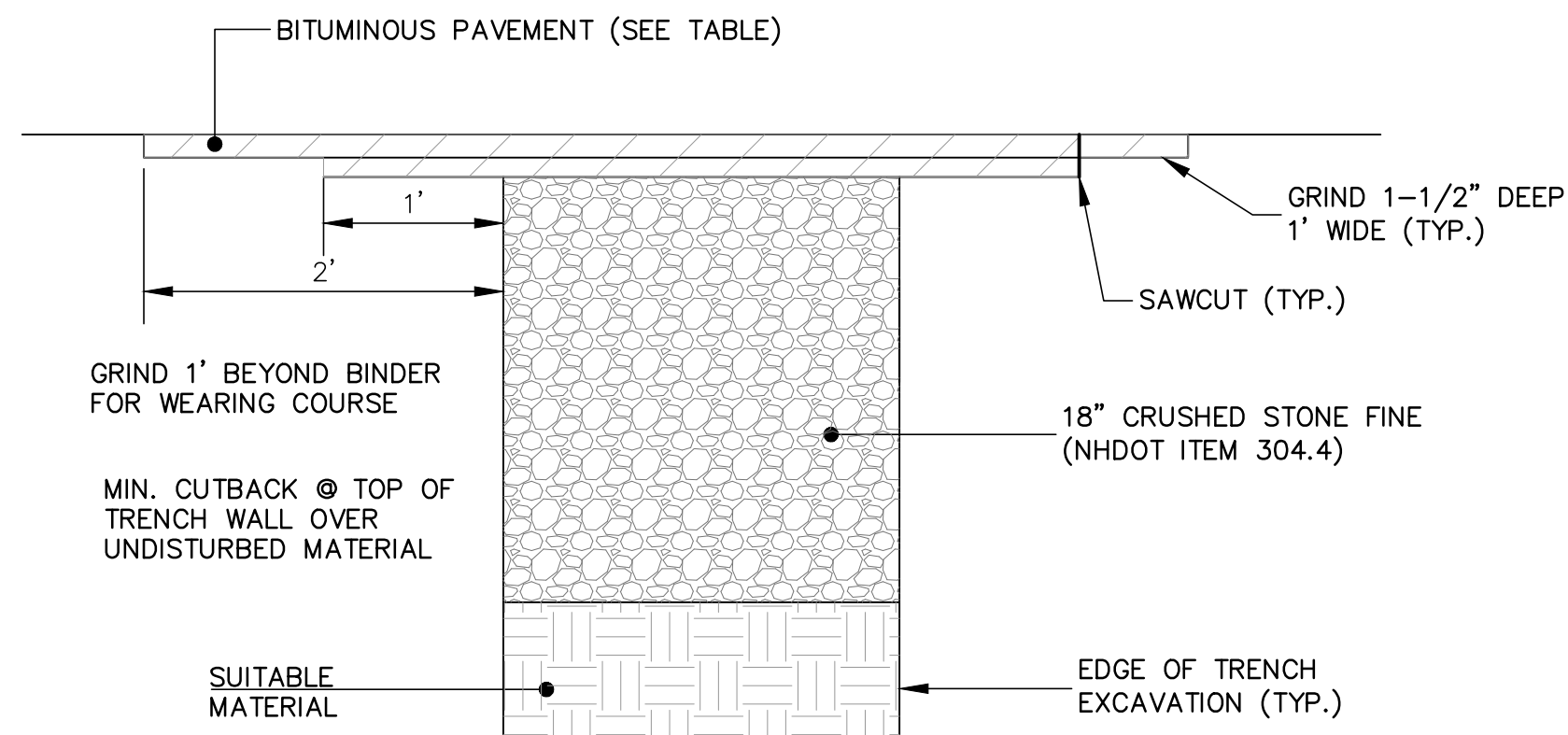
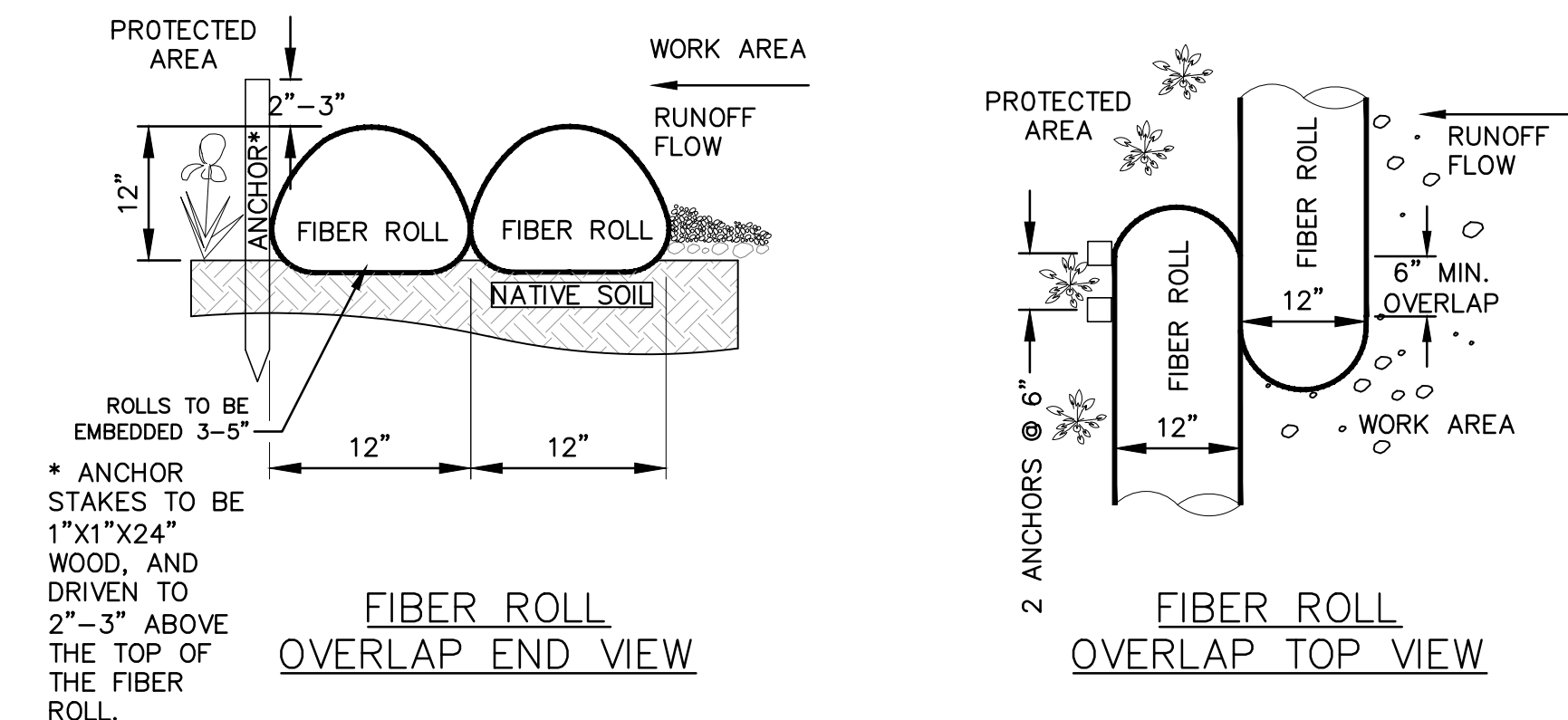
### "Silt Sack" Sediment Control Device for Inlet Protection

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### Temporary Tree Protection

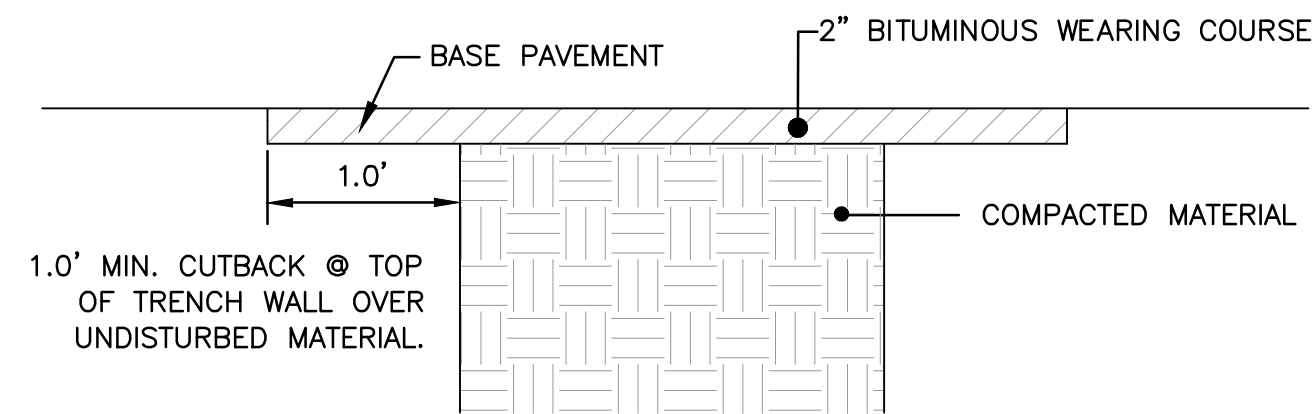
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### Permanent Trench Patch

PAVEMENT COURSES:

ROADS	COURSE	MINIMUM LIFT THICKNESS	NOMINAL MAX. AGGREGATE SIZE	GYRATORY COMPACTION EFFORT	MINIMUM BINDER CONTENT
RESIDENTIAL ROADS	WEARING	1-1/2"	3/8"	75	5.9%
	BASE	2-1/2"	3/4"	50	5.3%
LAFAYETTE ROAD	WEARING	1-1/2"	1/2"	50	5.9%
	BASE	4-1/2"	3/4"	50	5.3%



PAVEMENT COURSE:

COURSE	MINIMUM LIFT THICKNESS	NOMINAL MAX. AGGREGATE SIZE	GYRATORY COMPACTION EFFORT	MINIMUM BINDER CONTENT
WEARING	2"	1/2"	50	5.9%

### Temporary Trench Patch

PAVEMENT NOTES:

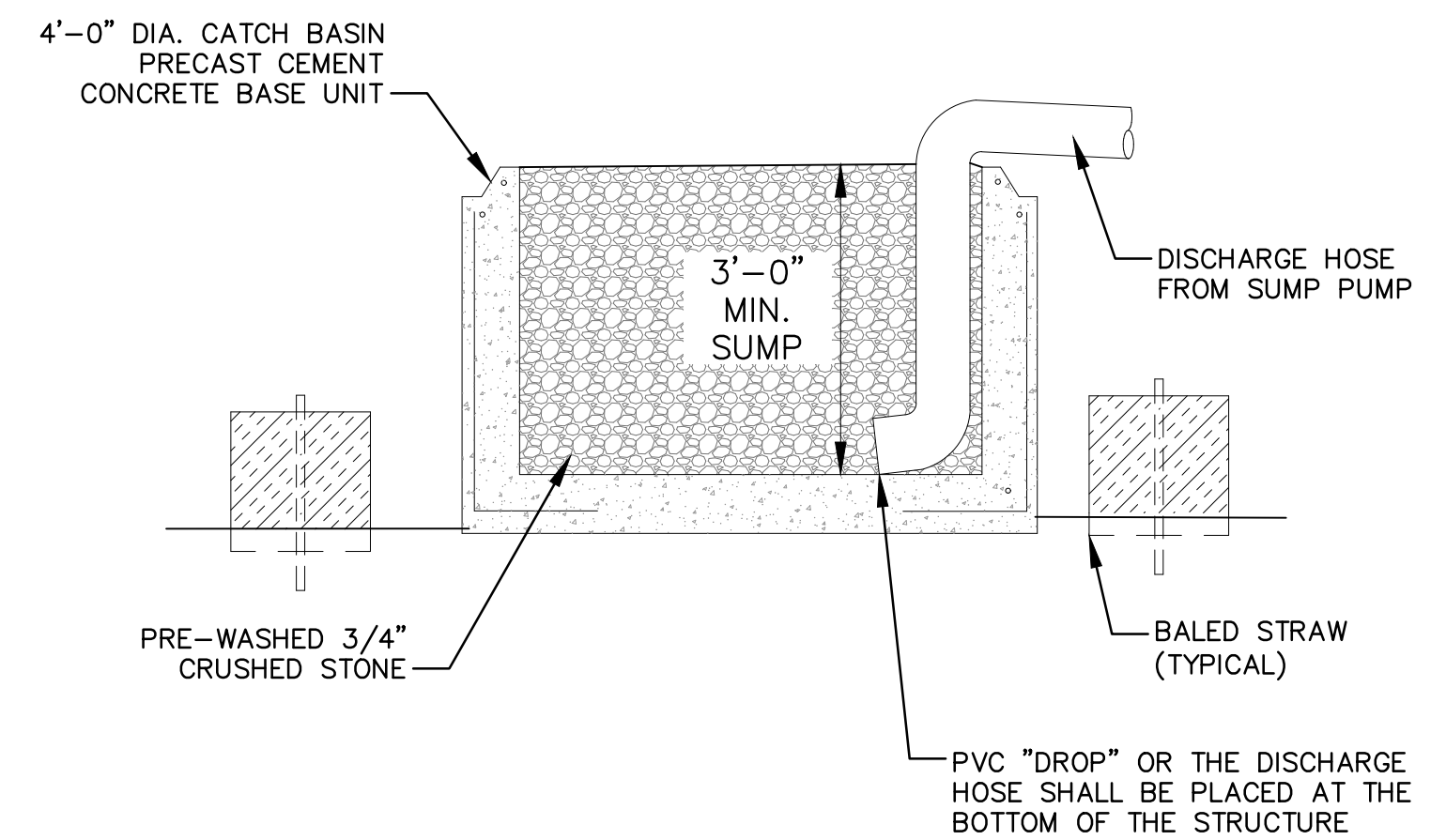
1. THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL AREAS DISTURBED BEYOND THE TRENCH PATCH LIMITS.
2. ANY TEMPORARY TRENCH PATCH IS CONSIDERED SACRIFICIAL AND REMOVAL/INCORPORATION OF TEMPORARY PATCH MATERIALS AND BASE MATERIALS SHALL BE SUBSIDIARY TO PERMANENT TRENCH PATCH REPAIR.
3. ALL PAVEMENT EDGES SHALL BE SAWCUT AND THE CONTRACTOR SHALL TRIM, TACK, AND MATCH EXISTING PAVEMENT AT LOCATIONS WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT (ALL SUBSIDIARY TO PAYMENT FOR TRENCH PATCH REPAIR).

### Trench Patch Details

Not to Scale

EROSION CONTROL NOTES:

1. PERIMETER CONTROLS TO BE INSTALLED PRIOR TO EARTH MOVING OPERATIONS.
2. PRIOR TO CONSTRUCTION AND THEREAFTER, EROSION CONTROL MEASURES ARE TO BE IMPLEMENTED AS NECESSARY. THE SMALLEST PRACTICAL AREA OF LAND SHOULD BE EXPOSED AT ANY ONE TIME DURING DEVELOPMENT, BUT IN NO CASE SHALL EXCEED 5 ACRES AT ANY ONE TIME BEFORE DISTURBED AREAS ARE STABILIZED. WHEN LAND IS EXPOSED DURING DEVELOPMENT, THE EXPOSURE SHOULD BE KEPT TO THE SHORTEST PRACTICAL PERIOD OF TIME. LAND SHOULD NOT BE LEFT EXPOSED DURING THE WINTER MONTHS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL REMEDIAL WORK REQUIRED TO REPAIR AREAS WHICH ARE DAMAGED BY EROSION.
3. CATCH BASIN INSERTS, MIRAFI DANDY SACK OR EQUAL, SHALL BE INSTALLED AND MAINTAINED AT CATCH BASINS UNTIL PAVEMENT IS INSTALLED. SEDIMENT AND DEBRIS SHALL BE REMOVED FOLLOWING EACH STORM EVENT.
4. HAY BALE BARRIERS SHALL BE INSTALLED AND MAINTAINED AT DRAIN INLETS AND OUTLETS (NOT PLACED CLOSER THAN 25- FEET) AND ALONG LIMITS OF WORK WHERE NECESSARY. ADDITIONAL HAY BALES SHALL BE ADDED AS REQUIRED BY THE ENGINEER. HAY BALES WILL BE STAKED AND MAINTAINED PRIOR TO AND DURING CONSTRUCTION UNTIL DISTURBED AREAS HAVE ESTABLISHED A HEALTHY STAND OF GRASS. BALED HAY AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE FROM NOXIOUS WEEDS OR WOODY STEMS AND SHALL BE DRY WHEN PLACED.
5. ALL DISTURBED AREAS AND SIDE SLOPES WHICH ARE FINISH GRADED WITH NO FURTHER CONSTRUCTION TO TAKE PLACE SHALL BE SEEDED AND MULCHED. ALL DISTURBED AREAS OUTSIDE LIMITS OF BUILDING, AND PAVEMENT SHALL BE STABILIZED WITH LOAM AND SEED. ALL SEED, LIME AND FERTILIZER PROGRAMS SHALL CONFORM TO ALL APPLICABLE SECTIONS OF THE SPECIFICATIONS.
6. ANY DISTURBED AREAS WHICH ARE TO BE LEFT TEMPORARILY, OR LONGER THAN TWO WEEKS AND WHICH WILL BE RE-GRADED LATER DURING CONSTRUCTION, SHALL BE TEMPORARILY SEEDED AND MACHINE STRAW MULCHED AT A RATE OF 1.5 TONS/ACRE.
7. AVOID USE OF UNDISTURBED AREAS WHEREVER POSSIBLE DURING CONSTRUCTION. CONSTRUCTION TRAFFIC SHALL TRAVEL THE ROADBEDS OF EXISTING AND FUTURE ROADS AND SHALL BE LIMITED TO WITHIN THE LIMITS OF CONSTRUCTION NOTED ON THE PLANS.
8. IF SILT FENCES ARE TO BE USED, THEY SHALL BE MINIMUM OF 36 INCHES HIGH WITH THE BOTTOM OF THE CLOTH KEYED INTO THE GROUND (SEE DETAIL). POSTS SHALL BE OF WOOD OR STEEL. SILT FENCE SHALL BE INSTALLED AND MAINTAINED AS NEEDED TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. ADDITIONAL SILT FENCE MAY BE ADDED AS REQUIRED BY THE ENGINEER PRIOR TO ANY ON-SITE GRADING OR DISTURBANCE OF EXISTING SURFACE MATERIAL. IT SHOULD BE MAINTAINED DURING AND AFTER DEVELOPMENT TO REMOVE SEDIMENT FROM RUNOFF WATER AND FROM LAND UNDERGOING DEVELOPMENT. WHERE POSSIBLE, NATURAL DRAINAGE WAYS SHOULD BE UTILIZED AND LEFT OPEN TO REMOVE CLEAN EXCESS SURFACE WATER. THE SILT FENCE IS TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE A HEALTHY STAND OF GRASS.
9. EROSION CONTROL DEVICES SHOWN REPRESENT MINIMUM MEASURES REQUIRED FOR EROSION CONTROL. THE CONTRACTOR SHALL TAKE ANY AND ALL NECESSARY MEASURES TO PREVENT TRANSPORTATION OF SEDIMENT BEYOND THE WORK AREA.
10. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED AND ACCUMULATED SEDIMENT DISPOSED OF AT THE CONTRACTOR'S EXPENSE.
11. ALL ROADWAYS AND PARKING LOTS SHALL BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
12. ALL CUT AND FILL SLOPES SHALL BE SEEDED/LOAMED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
13. ALL EROSION CONTROLS SHALL BE INSPECTED WEEKLY AND AFTER EVERY 0.5" OF RAINFALL.
14. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
  - BASE COURSE STONE HAS BEEN INSTALLED IN AREAS TO BE PAVED
  - A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED
  - A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIPRAP HAS BEEN INSTALLED
  - EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED
15. ALL AREAS SHALL BE STABILIZED WITHIN 45 DAYS OF INITIAL DISTURBANCE.
16. TEMPORARY SEEDING (IF USED) SHALL BE PERENNIAL RYE GRASS, SPREAD 0.7LB/1000 SQ. FT.
17. WINTER CONSTRUCTION NOTES
  - ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHALL BE STABILIZED BY SEEDING AND INSTALLING EROSION CONTROL BLANKETS ON SLOPES GREATER THAN 3:1, AND SEEDING AND PLACING 3 TO 4 TONS OF MULCH PER ACRE, SECURED WITH ANCHORED NETTING, ELSEWHERE. THE INSTALLATION OF EROSION CONTROL BLANKETS OR MULCH AND NETTING SHALL NOT OCCUR OVER ACCUMULATED SNOW OR ON FROZEN GROUND AND SHALL BE COMPLETED IN ADVANCE OF THAW OR SPRING MELT EVENTS;
  - ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHALL BE STABILIZED TEMPORARILY WITH STONE OR EROSION CONTROL BLANKETS APPROPRIATE FOR THE DESIGN FLOW CONDITIONS;
  - AFTER NOVEMBER 15TH, INCOMPLETE ROAD OR PARKING SURFACES, WHERE WORK HAS STOPPED FOR THE WINTER SEASON, SHALL BE PROTECTED WITH A MINIMUM OF 3 INCHES OF CRUSHED GRAVEL PER NHDOT ITEM 304.3.
18. AFTER CONSTRUCTION IS COMPLETE, THE CONTRACTOR SHALL REMOVE THE STABILIZED CONSTRUCTION ENTRANCE AND REPLACE WITH THE IMPROVED GRAVEL SECTION PER THE NOTES AND DETAIL.



date	February 2024	project no.	1211	checked by:	PAC	scale:	1" = 10'
designed by:	CFC/SIF	drawn by:	WWG	approved by:	PAC	20'	
<p>City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Erosion Control Details</p>							
drawing no.	D-5						
sheet:	35	of	55				

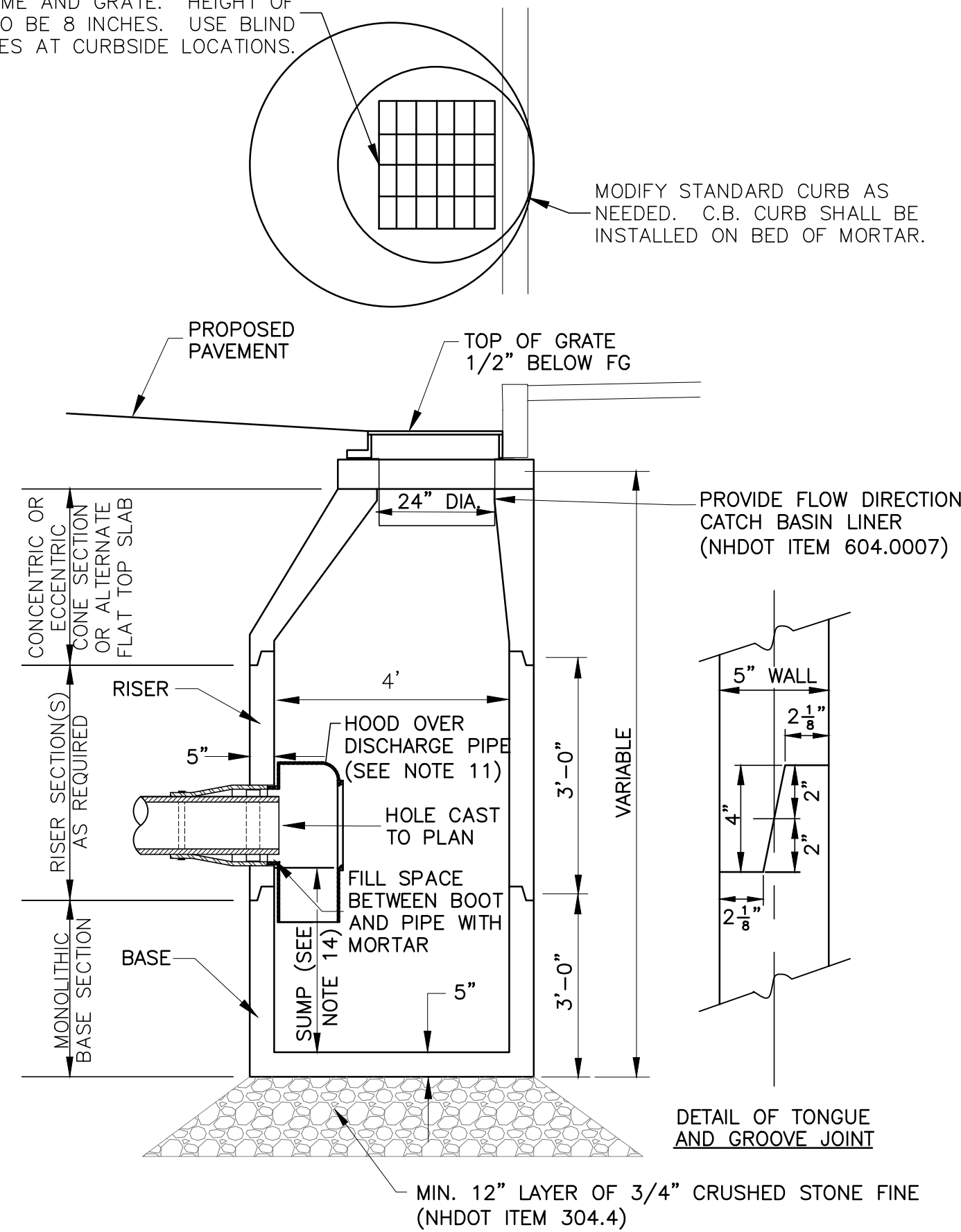
**CMA ENGINEERS**  
Civil/Environmental/Structural  
Portsmouth, NH 603/431-6196  
Manchester, NH 603/627-0708  
Portland, ME 207/651-4223

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PROVIDE NH STANDARD TYPE B CAST IRON FRAME AND GRATE. HEIGHT OF FRAME TO BE 8 INCHES. USE BLIND FLANGES AT CURBSIDE LOCATIONS.

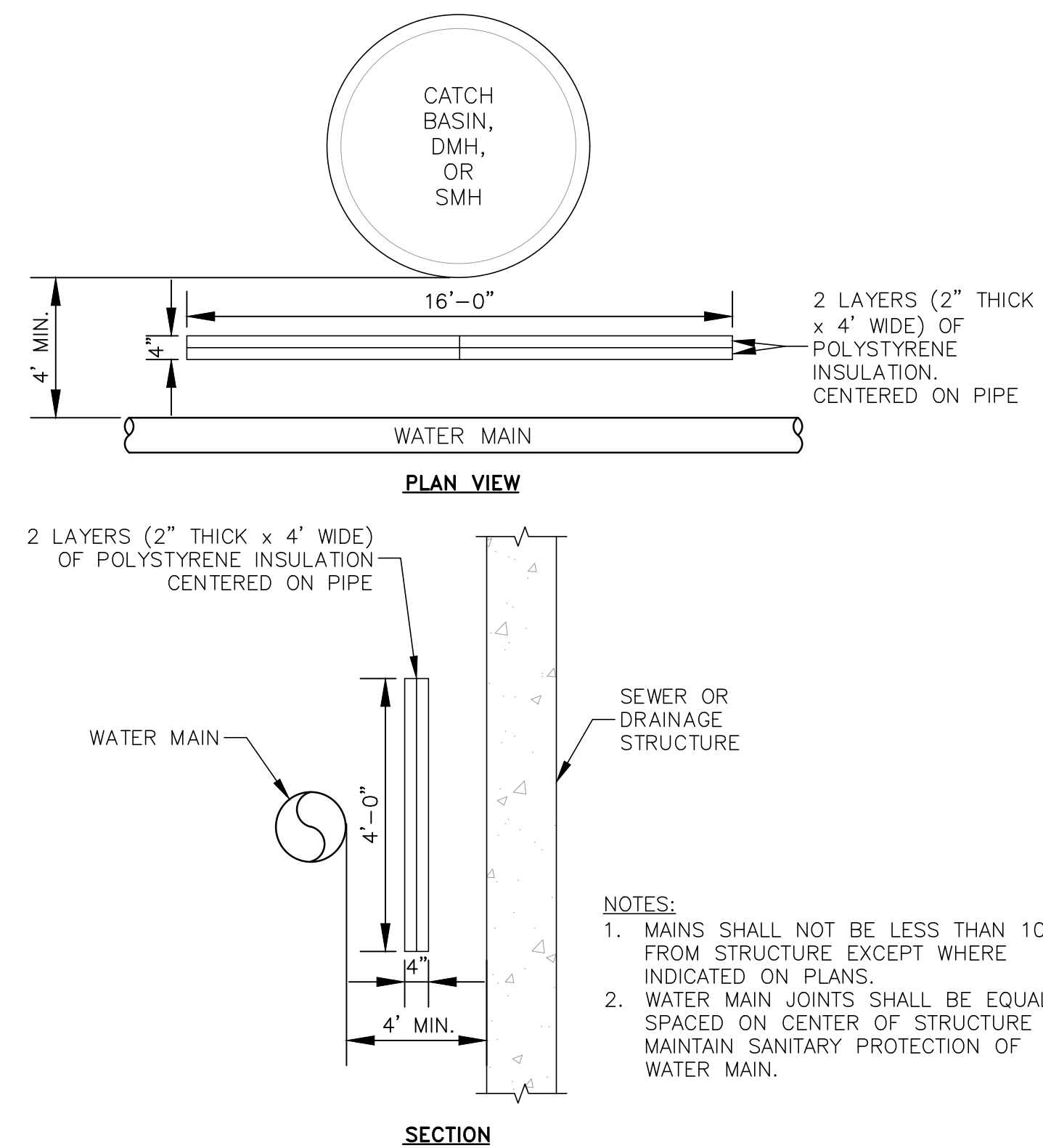


### Catch Basin Detail

Not to Scale

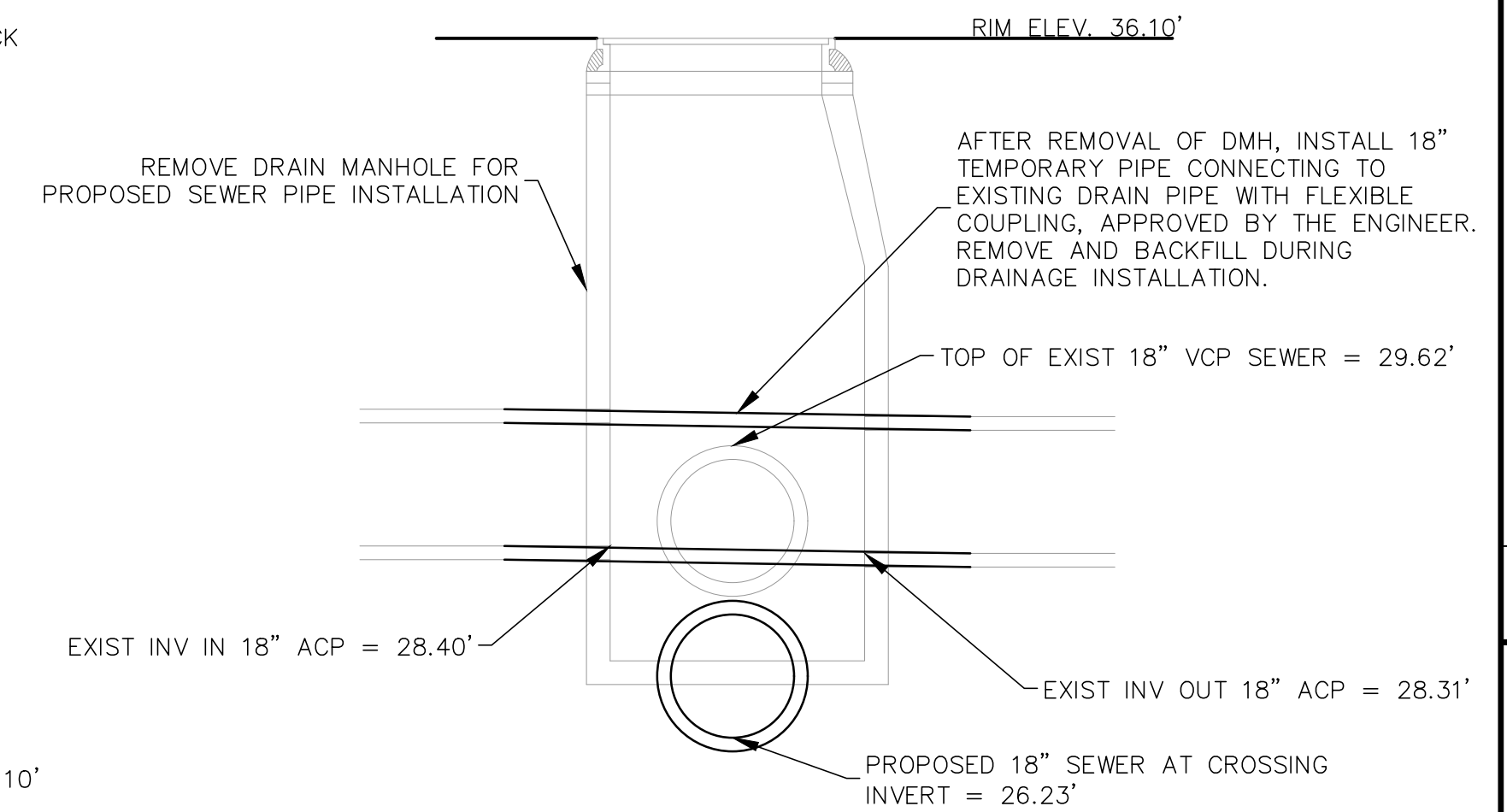
#### NOTES:

- HORIZONTAL JOINTS BETWEEN SECTIONS OF PRECAST CONCRETE BARRELS SHALL BE OF A TYPE APPROVED BY THE ENGINEER, WHICH SHALL, IN GENERAL, DEPEND FOR WATERTIGHTNESS UPON AN ELASTOMERIC OR MASTIC-LIKE GASKET.
- PIPE-TO-MANHOLE JOINTS SHALL BE ONLY AS APPROVED BY THE ENGINEER AND IN GENERAL WILL DEPEND FOR WATERTIGHTNESS UPON EITHER AN APPROVED NON-SHRINKING MORTAR OR ELASTOMERIC SEALANT.
- FOR BITUMASTIC TYPE JOINTS, THE AMOUNT OF SEALANT SHALL BE SUFFICIENT TO FILL AT LEAST 75% OF THE JOINT CAVITY. APPROVED BITUMASTIC SEALANTS INCLUDE RAM-NEK, KENT SEAL NO. 2, EZ OR EQUAL.
- ALL STRUCTURES SHALL MEET H-20 LOADING. CONCRETE SHALL BE 4,000 PSI AFTER 28 DAYS.
- THE TONGUE OR THE GROOVE OF THE JOINT OF THE WALL SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQ.IN. PER LINEAR FOOT.
- CONE SECTIONS MAY BE EITHER CONCENTRIC OR ECCENTRIC, OR FLAT SLAB TOPS MAY BE USED WHERE PIPE WOULD OTHERWISE ENTER INTO THE CONE SECTION.
- CATCH BASIN GRATES TO BE NHDOT TYPE B OR TYPE E GRAY IRON. FOR TYPE B FRAME SHALL BE 3 FLANGE TYPE.
- HOOD ON CATCH BASINS SHALL BE "THE ELIMINATOR" OIL AND FLOATING DEBRIS TRAP AS MANUFACTURED BY GROUNDWATER RESCUE, INC. OR APPROVED EQUAL.
- ALL STRUCTURES WITH MULTIPLE PIPES SHALL HAVE A MINIMUM OF 12" OF INSIDE SURFACE BETWEEN HOLES.
- ECCENTRIC CONES SHALL BE USED WHEN DEPTH TO CROWN OF SHALLOWEST PIPE EXCEEDS 30"; OTHERWISE FLAT TOP SLABS SHALL BE USED. RISERS OF 12", 36" AND 48" CAN BE USED TO REACH THE DESIRED DEPTH.
- HOOD ON CATCH BASINS SHALL BE "THE ELIMINATOR" OIL AND FLOATING DEBRIS TRAP AS MANUFACTURED BY GROUNDWATER RESCUE, INC. OF QUINCY, MA OR APPROVED EQUAL. CONTRACTOR SHALL DRILL 1/4" VERTICAL HOLE AT TOP OF HOOD.
- FRAME AND GRATES SHALL BE BROUGHT TO GRADE USING GRADE SS HARD BRICKS (2 COURSE MIN., 12" MAX.) LAID FLAT. FRAMES SHALL BE SET IN A FULL BED OF MORTAR AND SEALED WITH PORTLAND CEMENT.
- ECCENTRIC CONES SHALL BE USED WHEN DEPTH TO CROWN OF SHALLOWEST PIPE EXCEEDS 30".
- ALL CATCH BASINS SHALL HAVE A 4' SUMP.



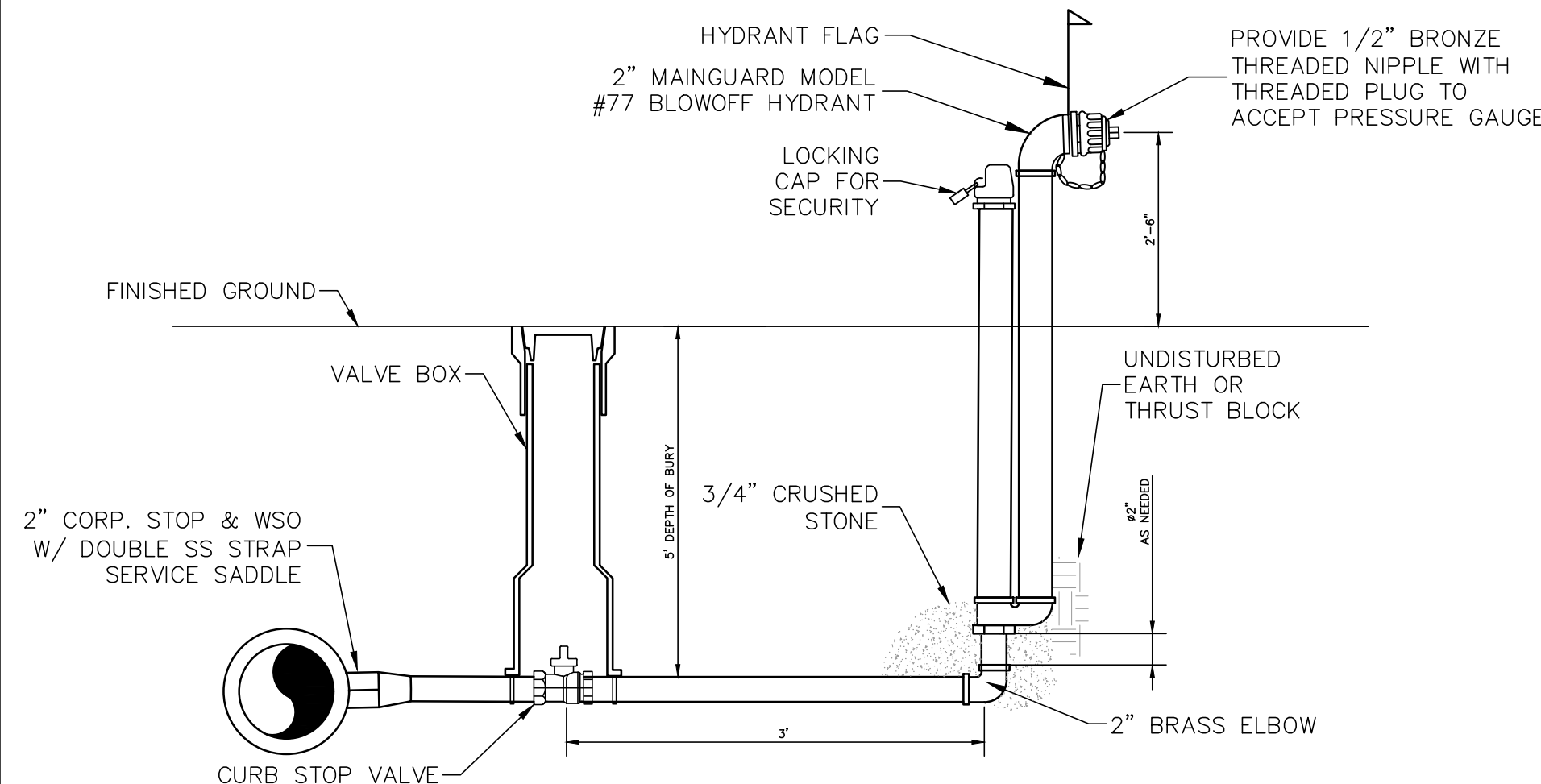
### Water Main Insulation Detail

Not to Scale



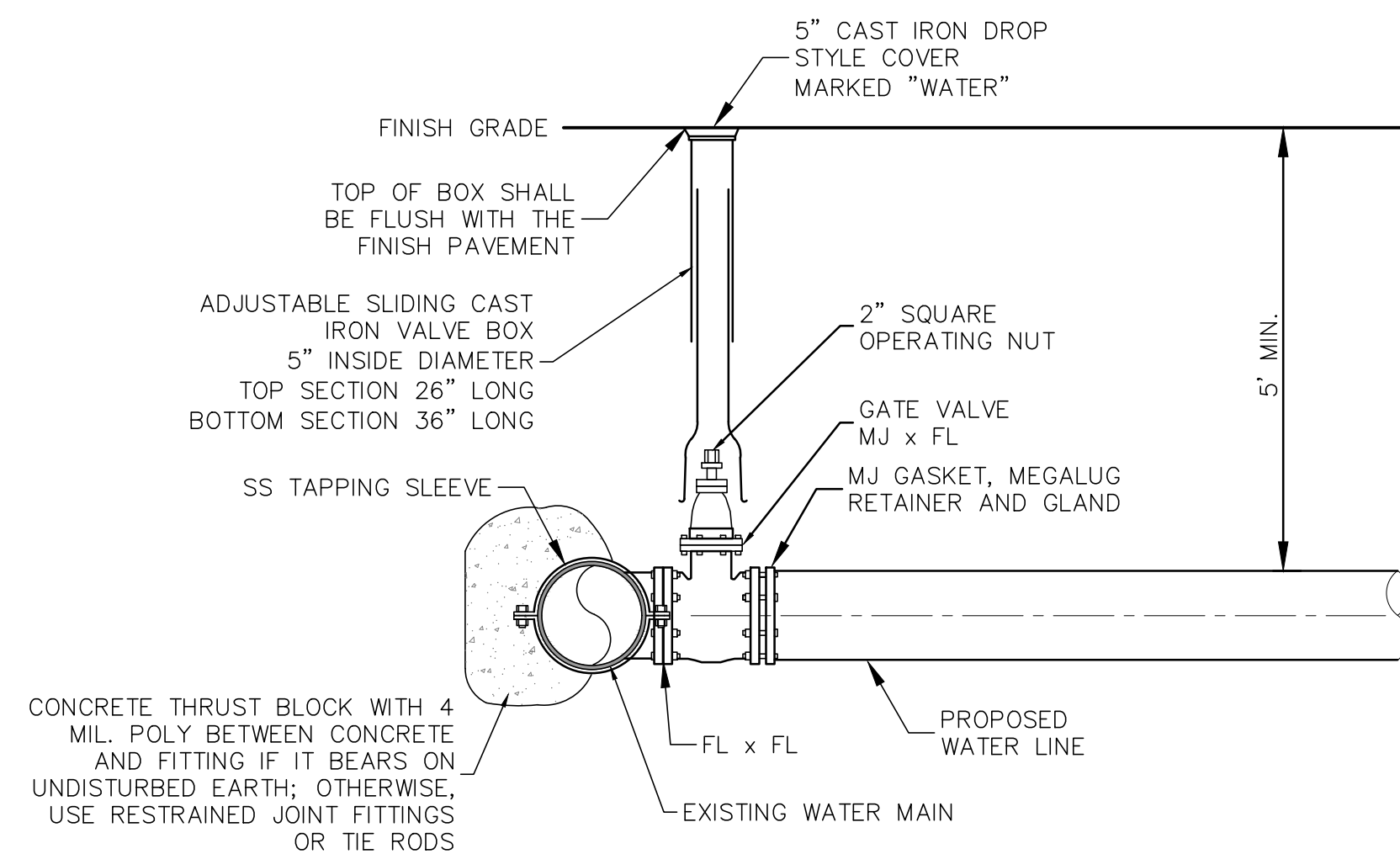
### Orchard Street Drain Manhole Detail with Sewer

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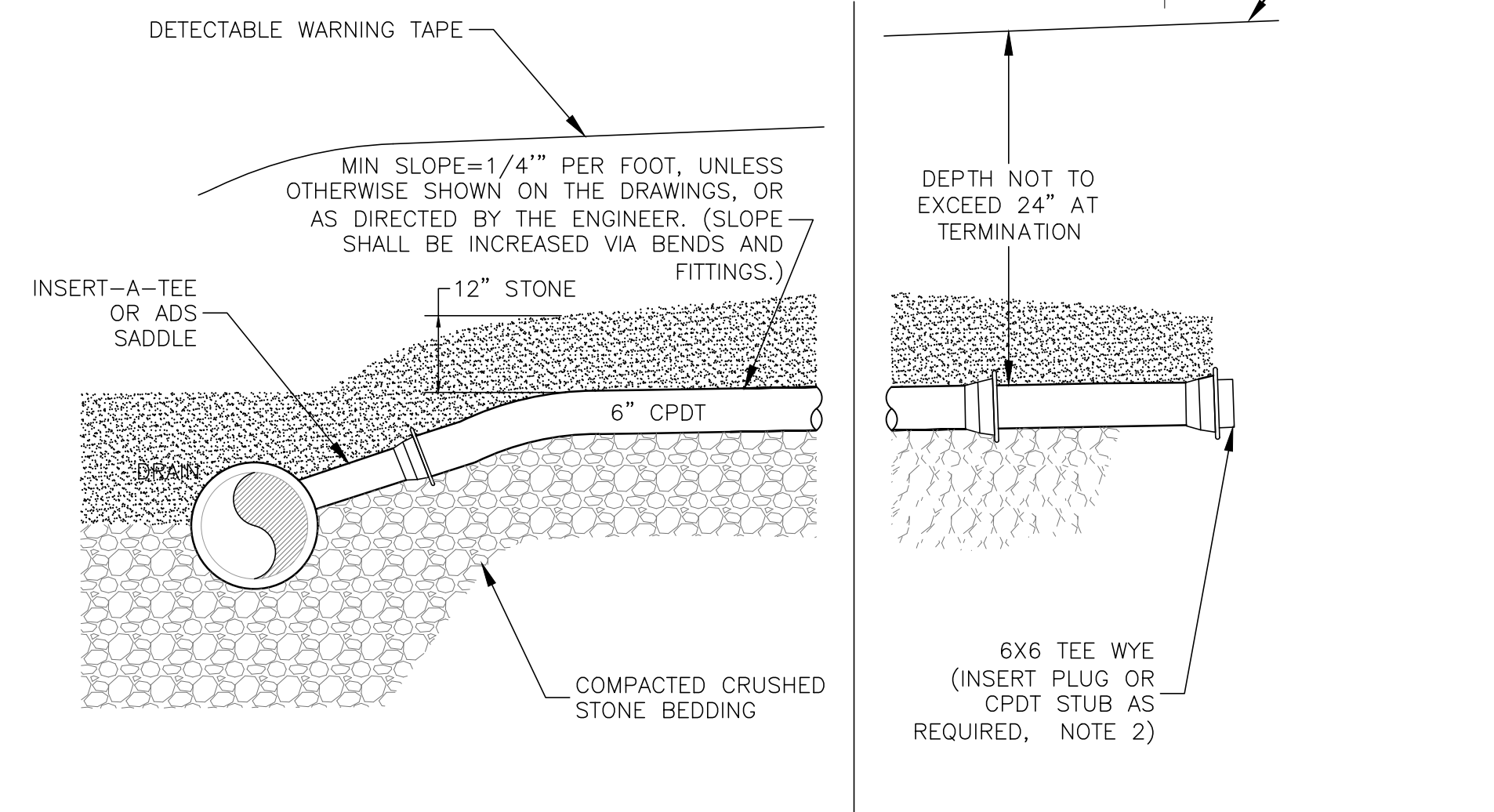
### Blowoff Detail

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### Water Main Connection with Tapping Sleeve

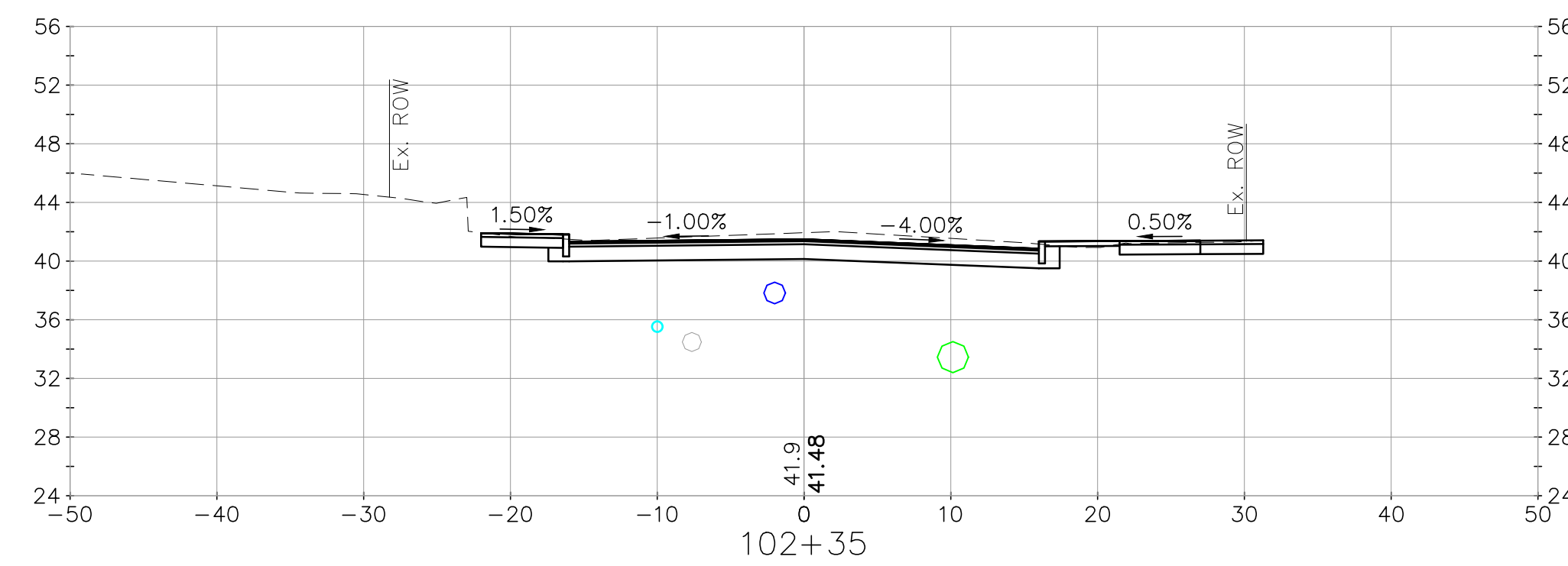
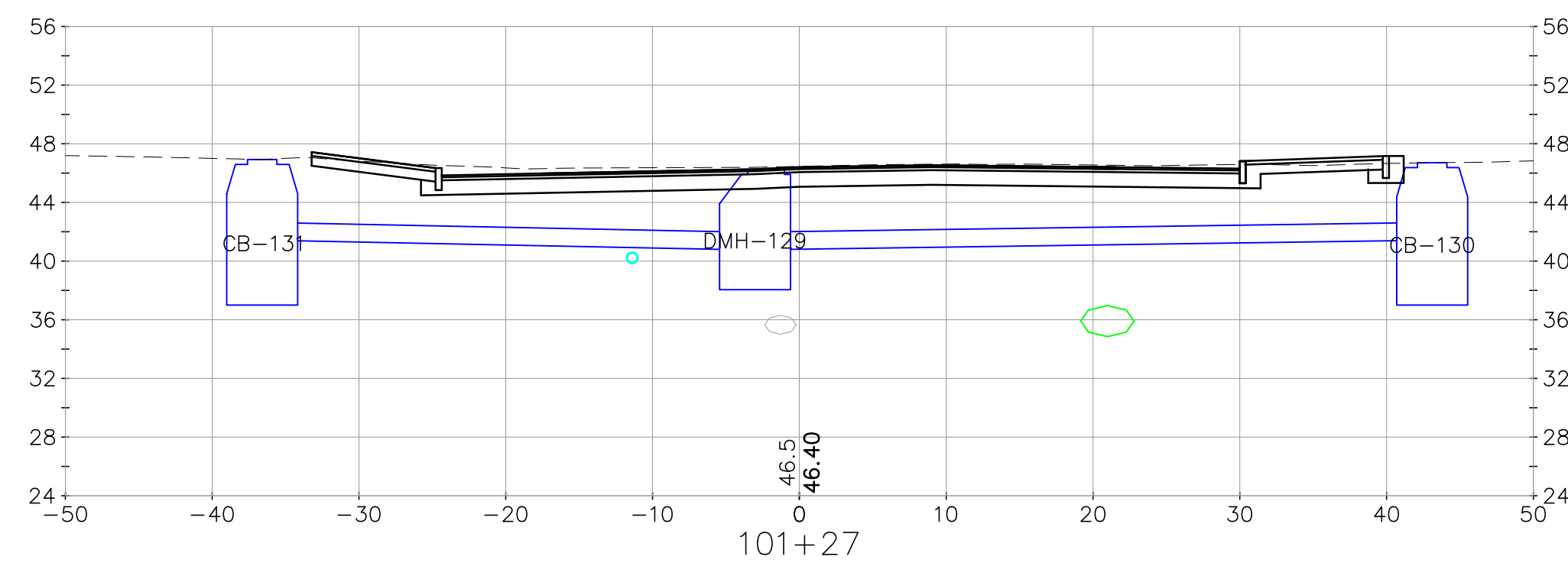
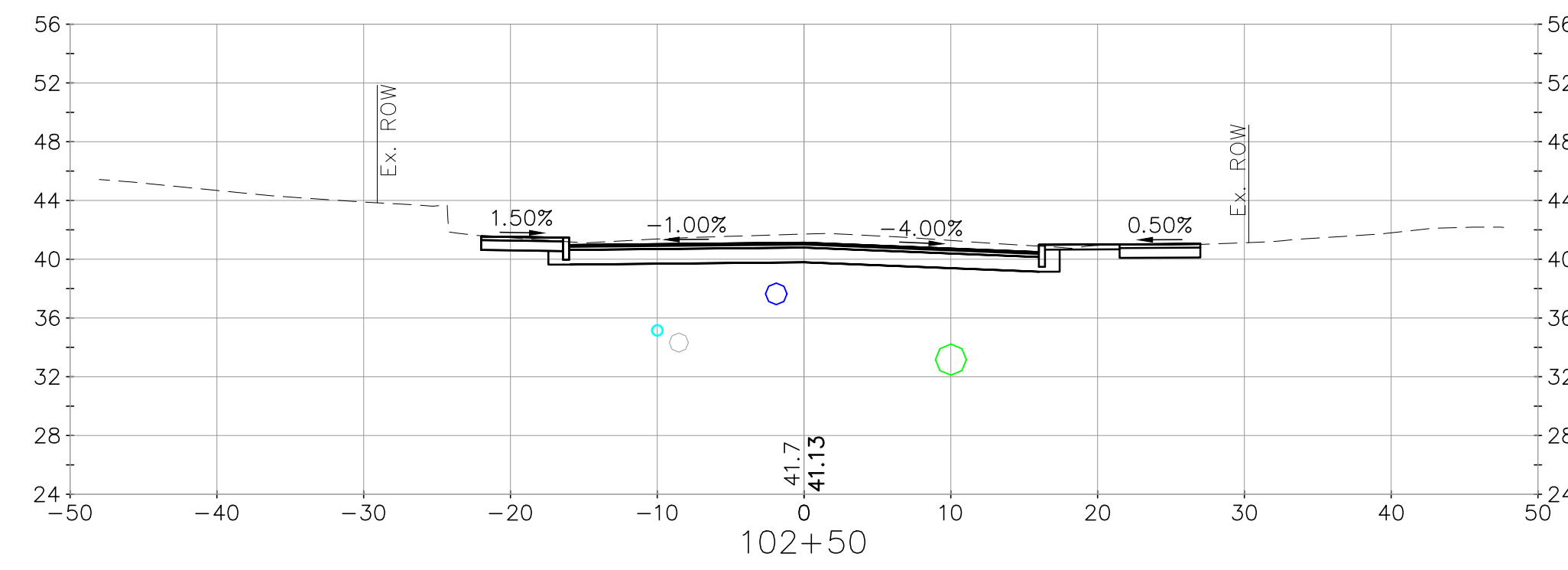
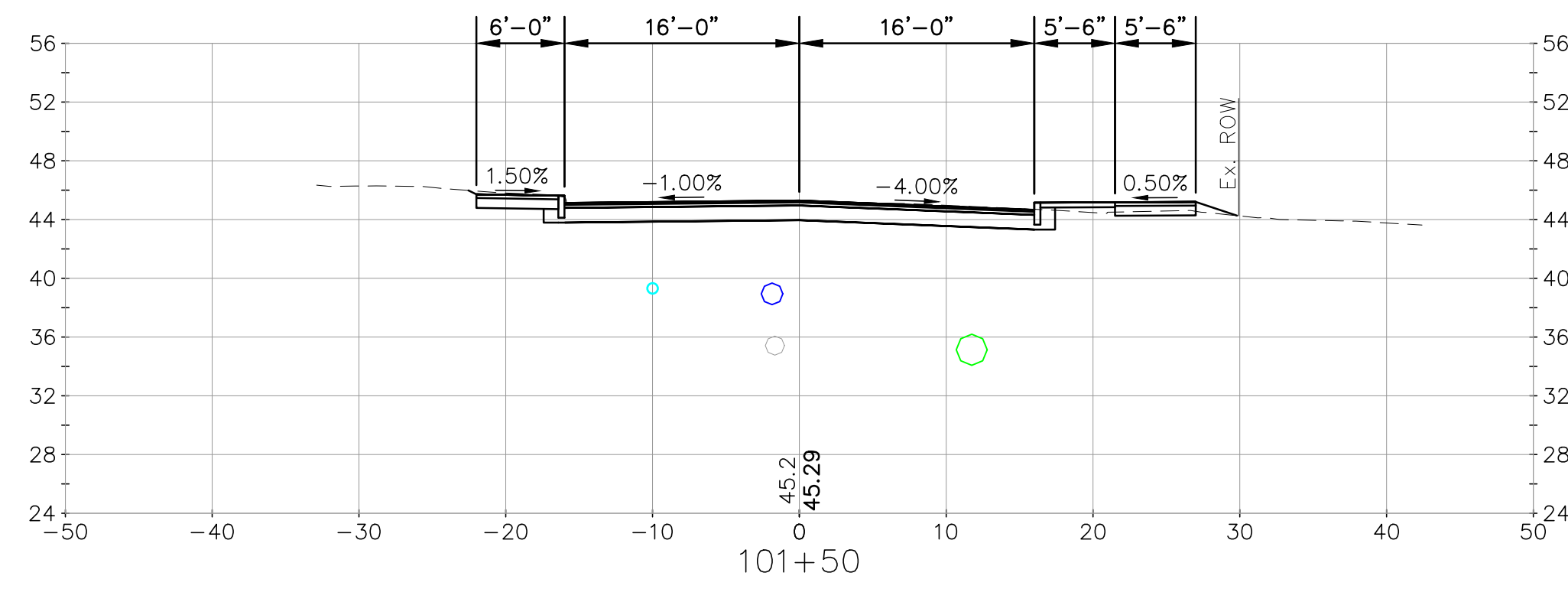
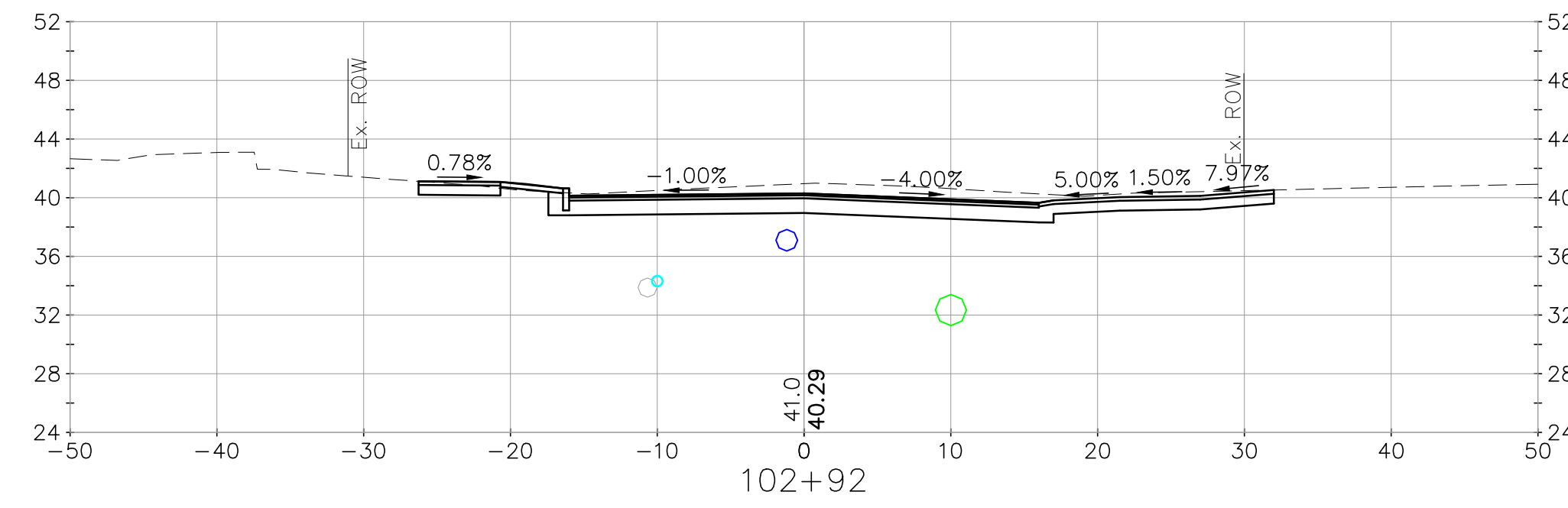
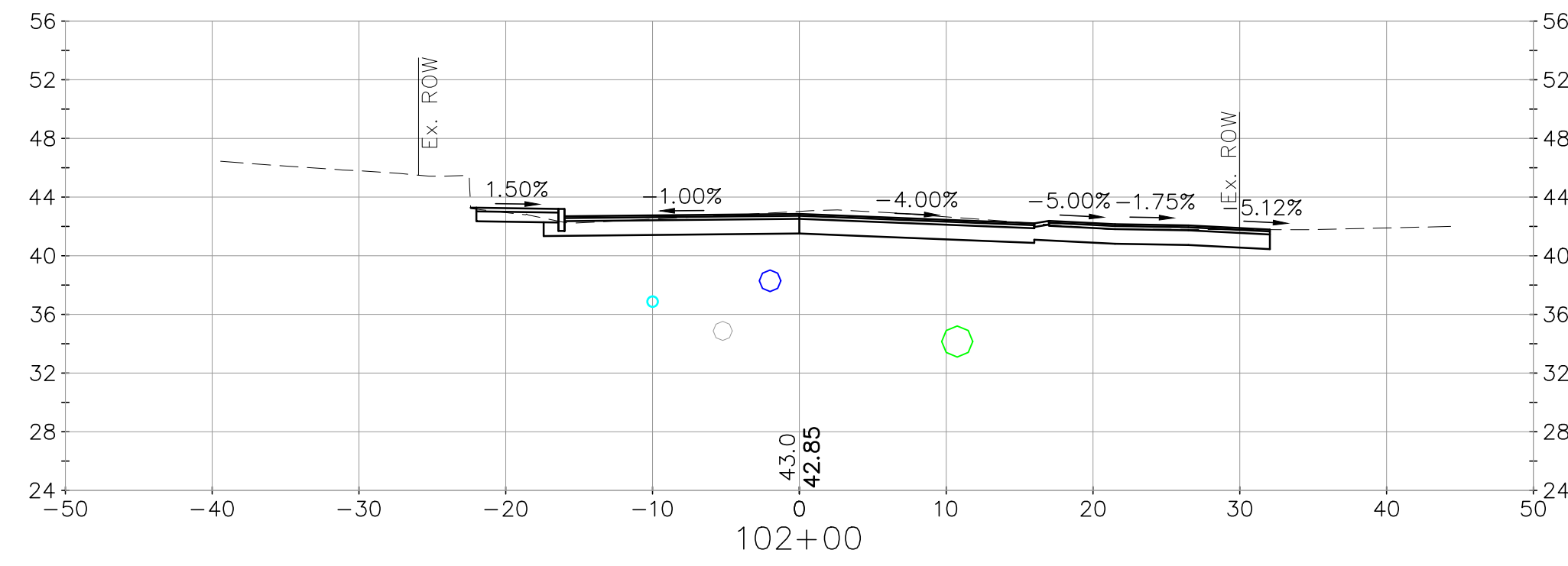
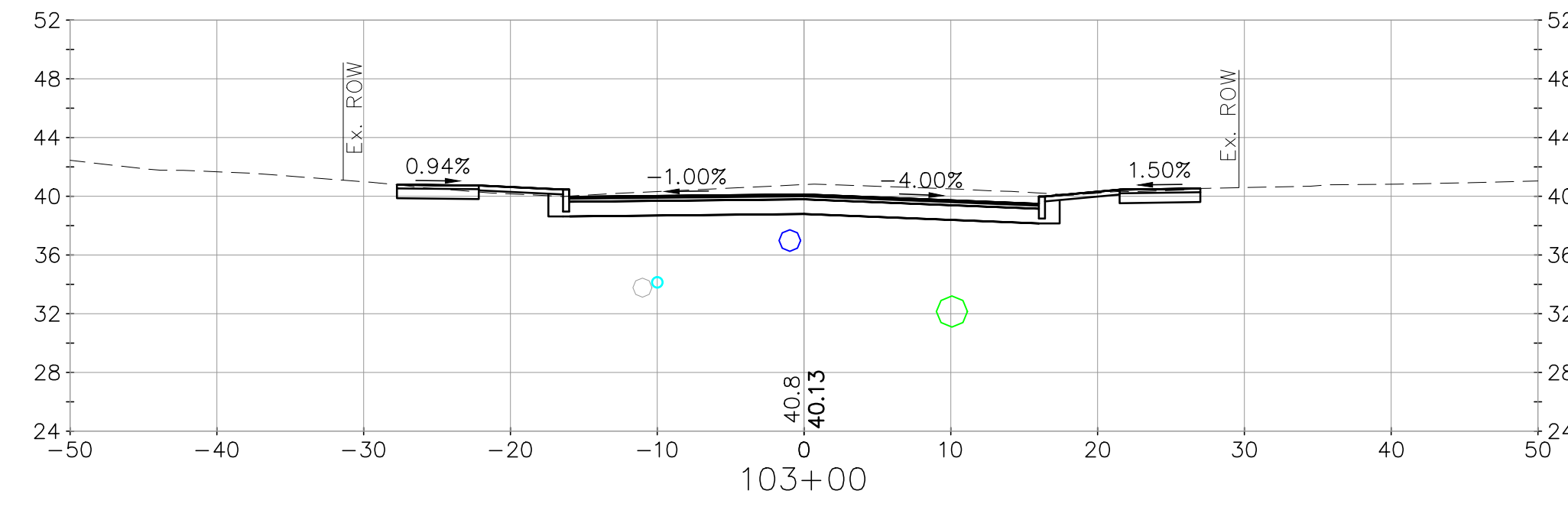
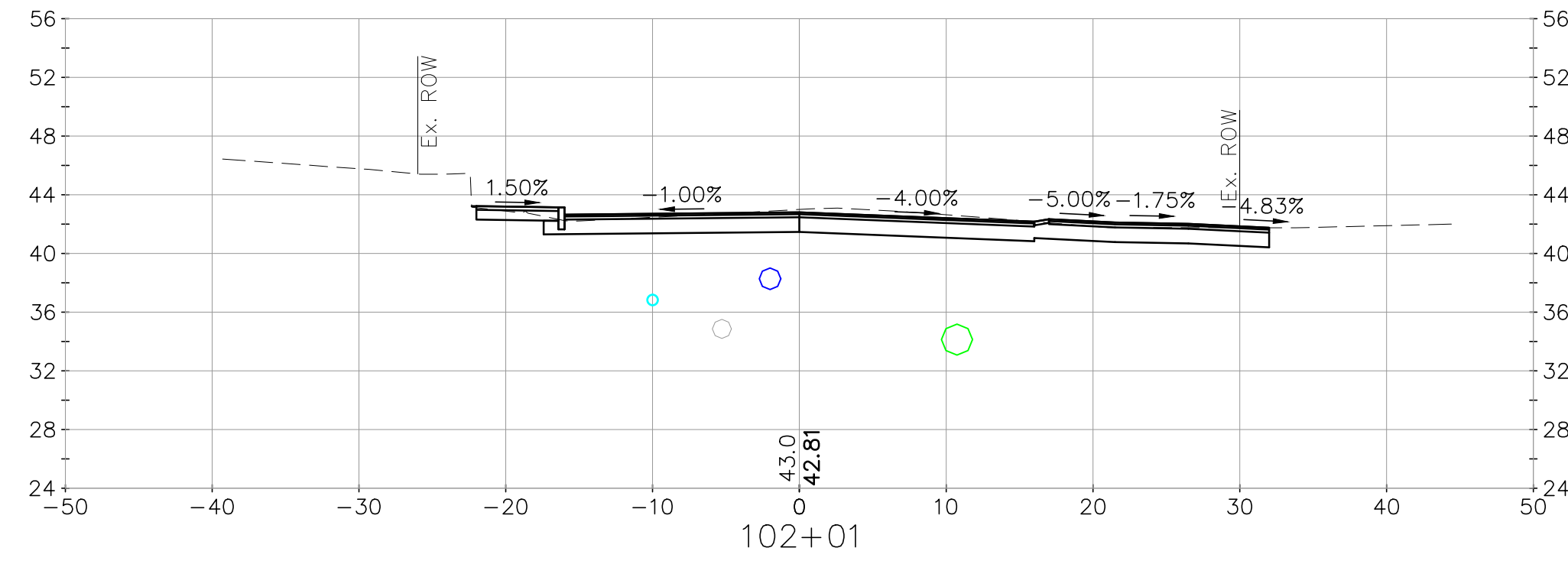
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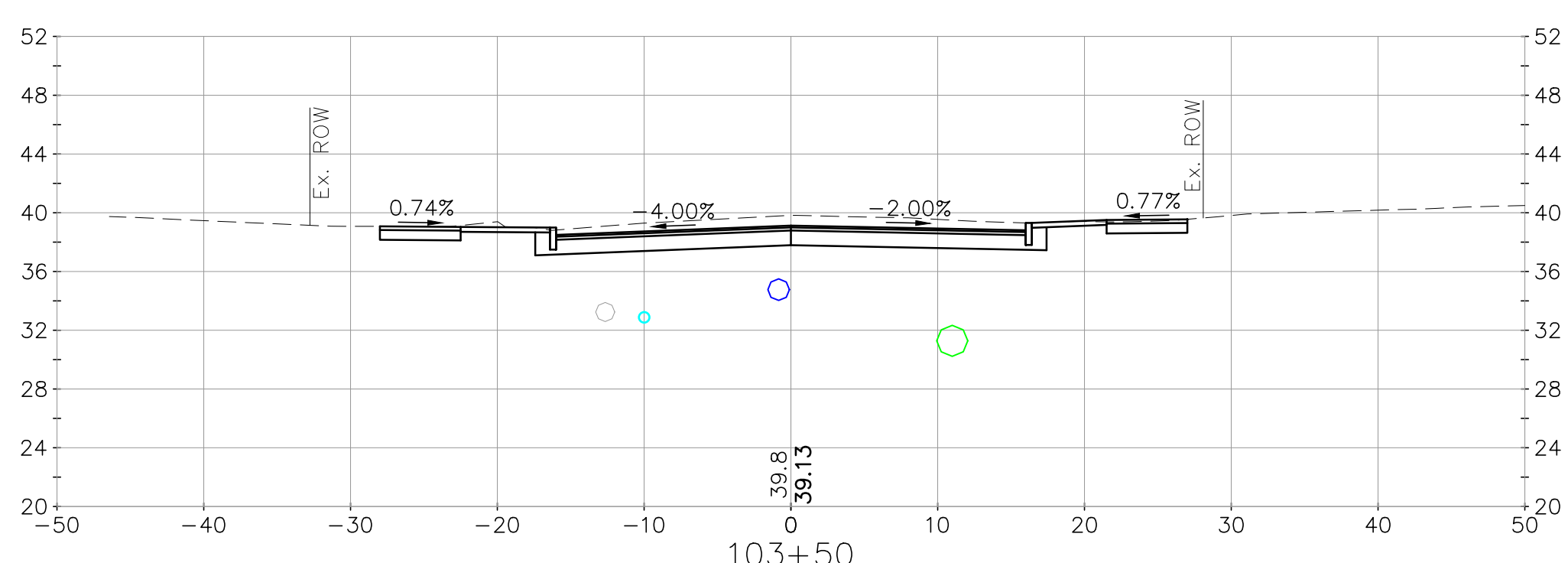
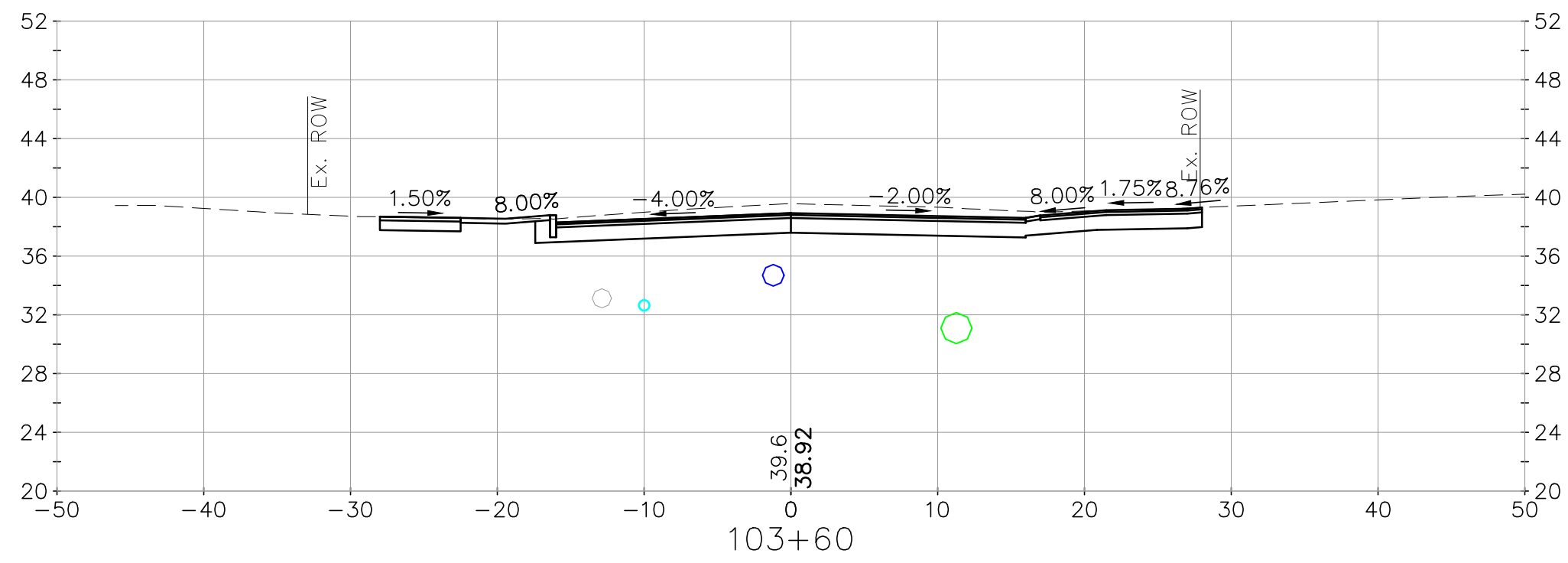
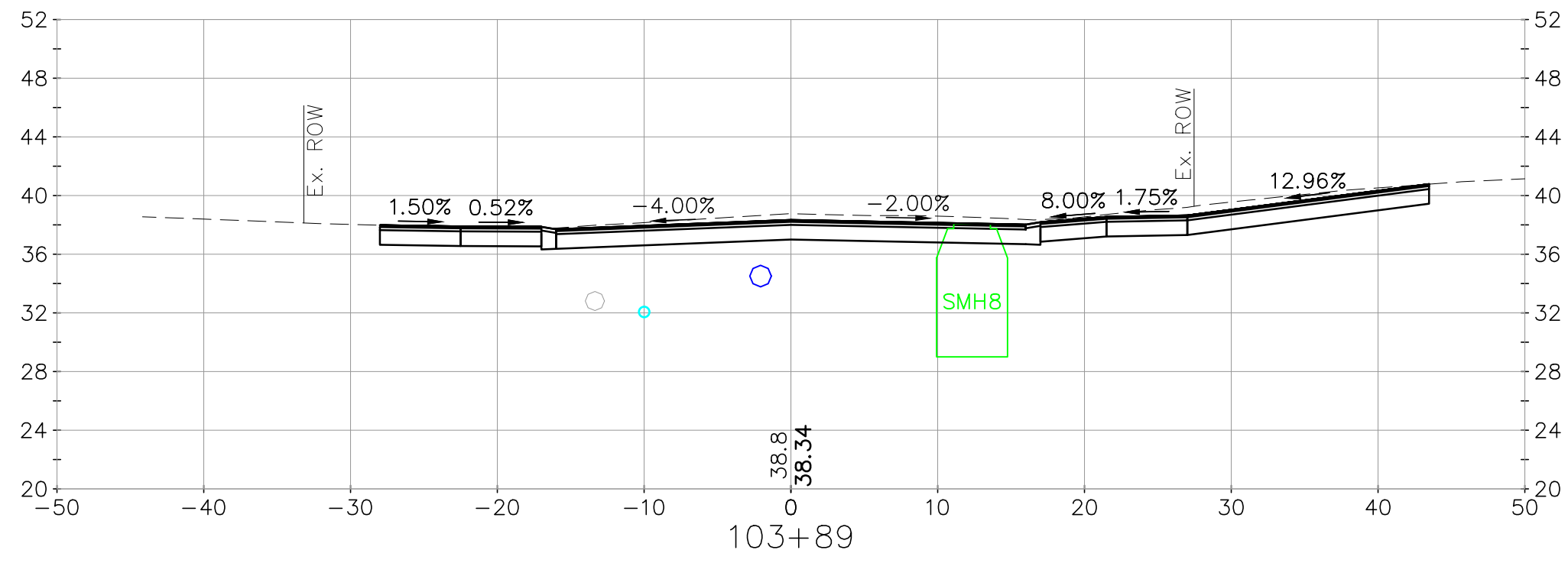
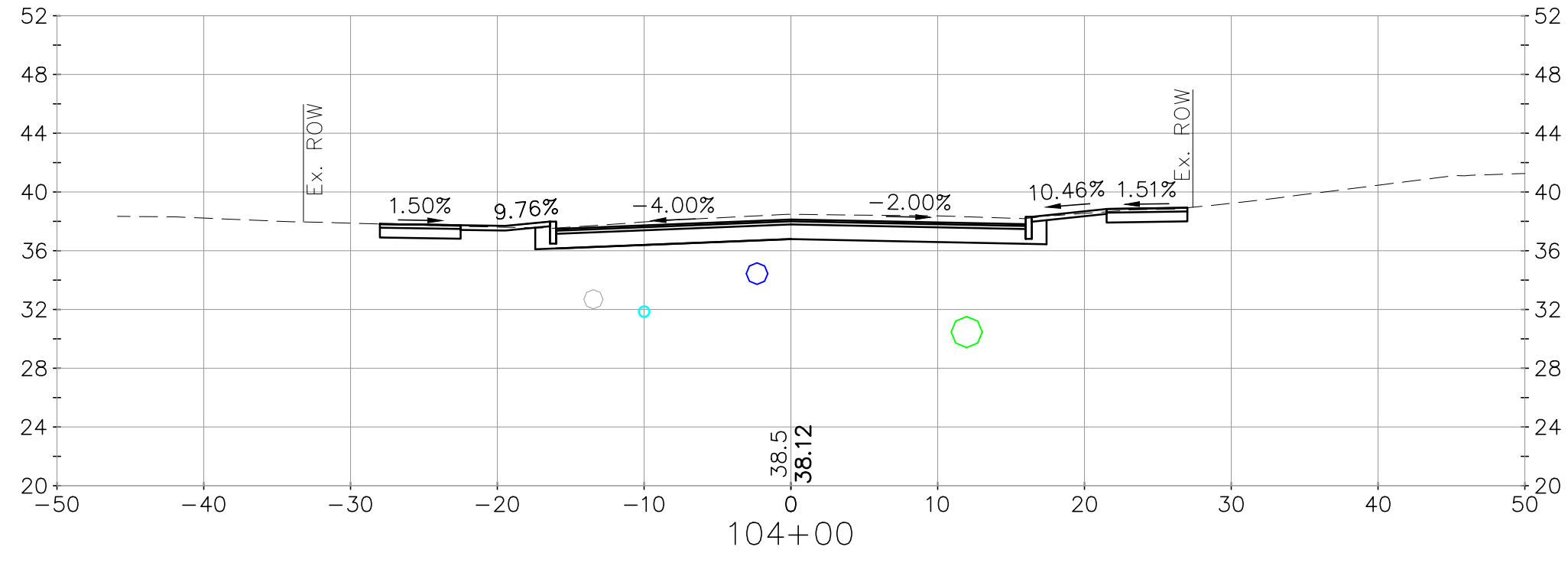
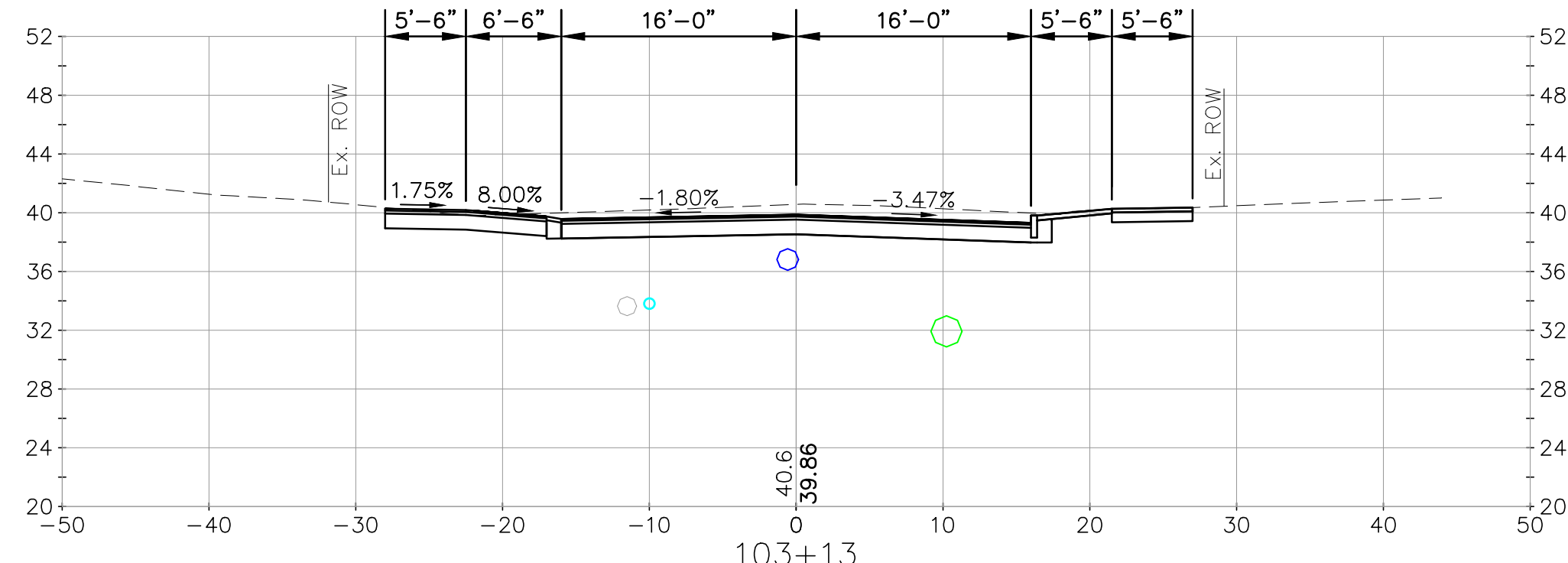
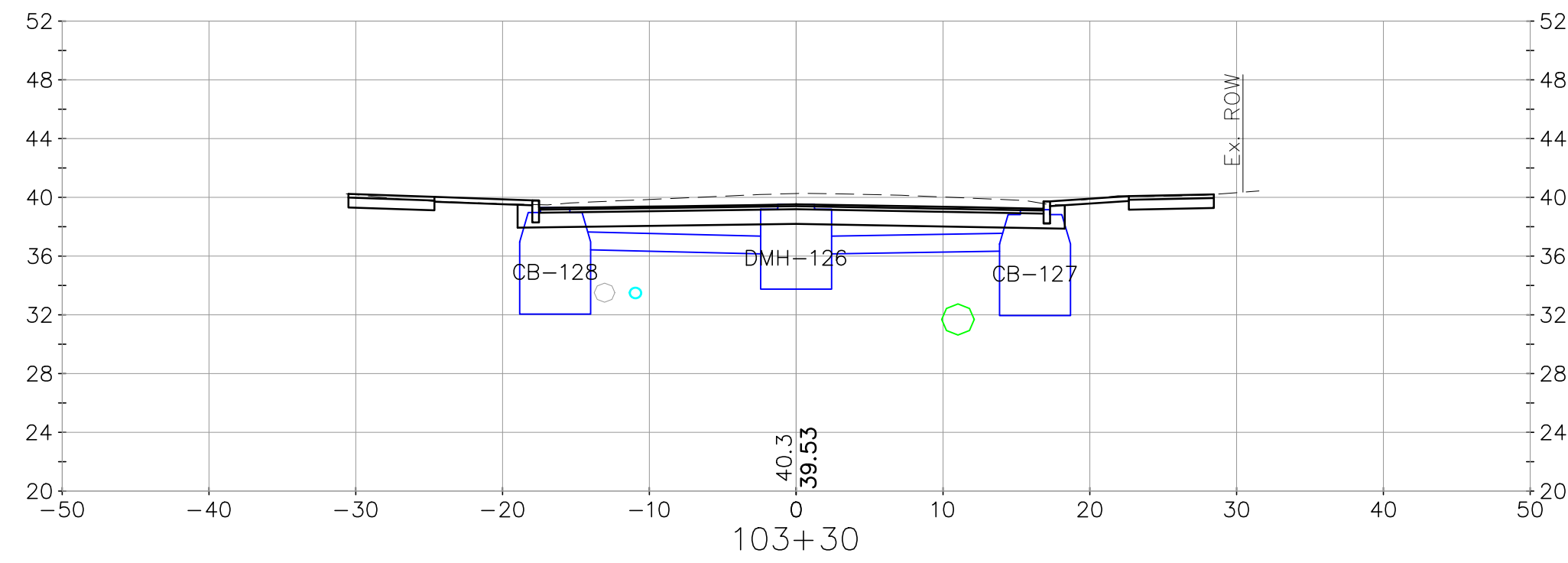
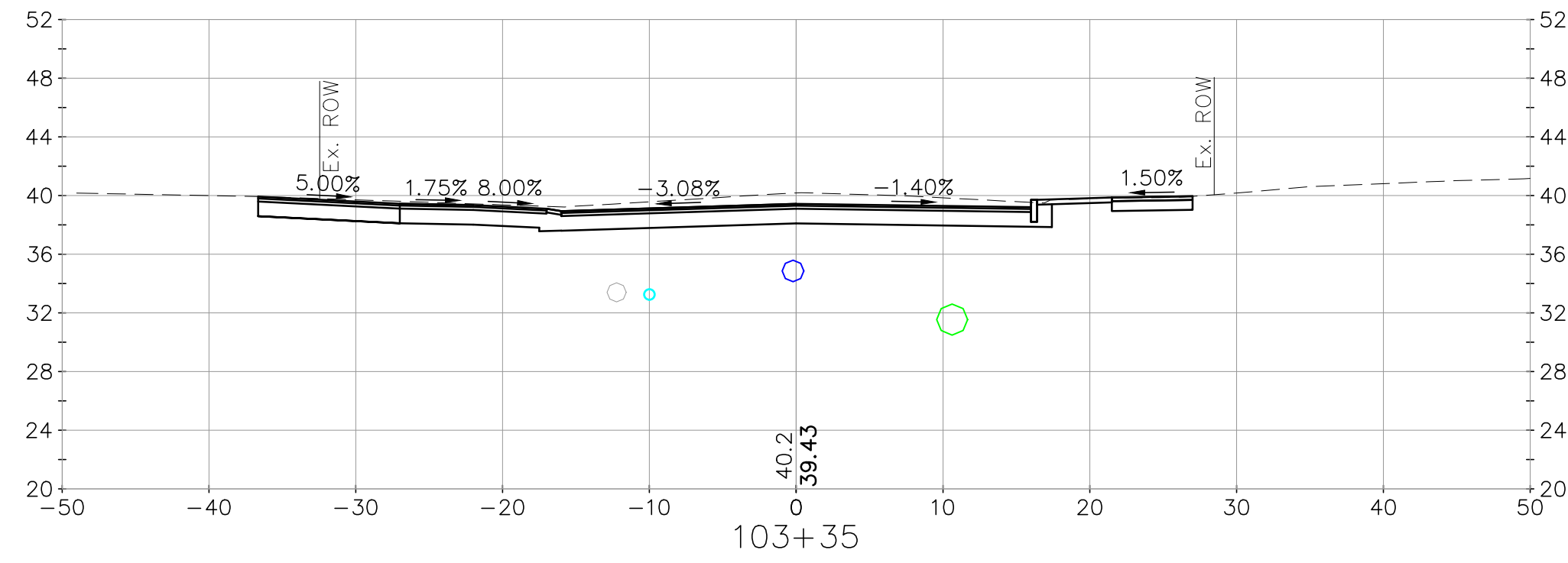
### Drain Lateral and Roof Leader Connection

Not to Scale

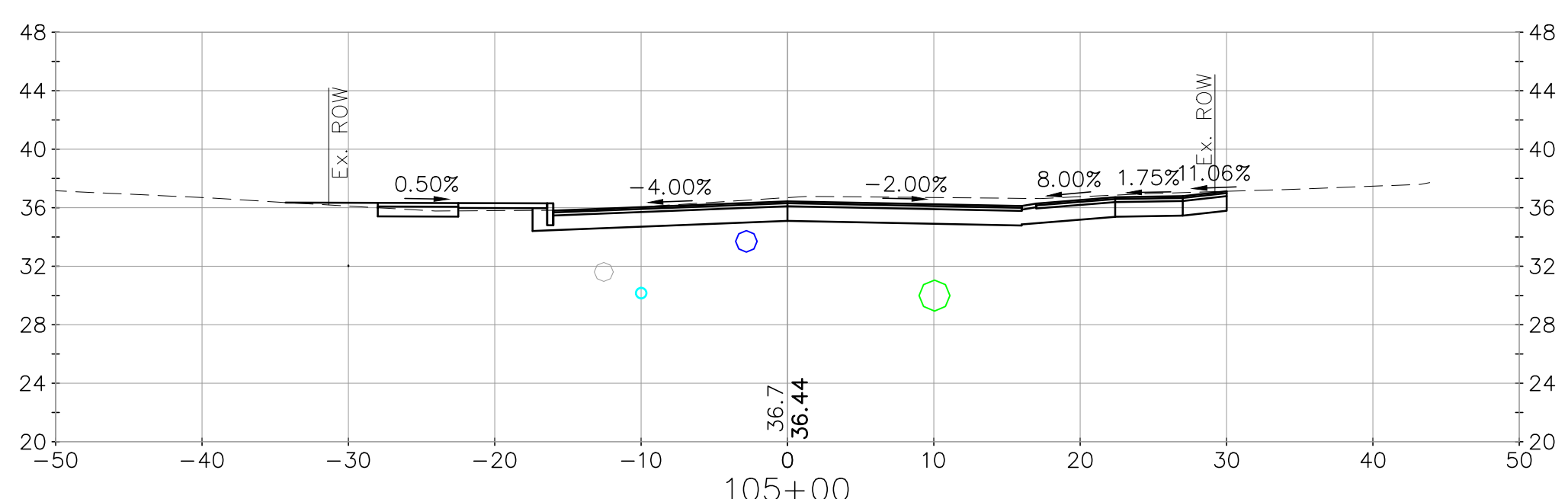
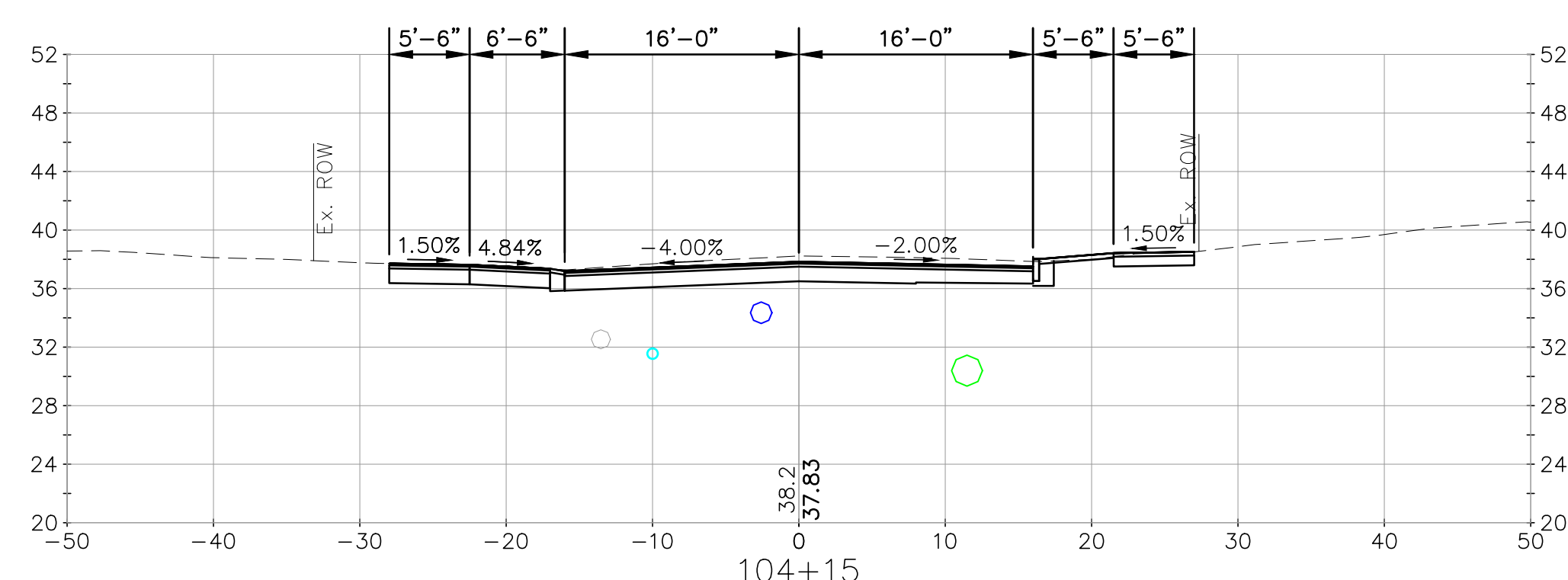
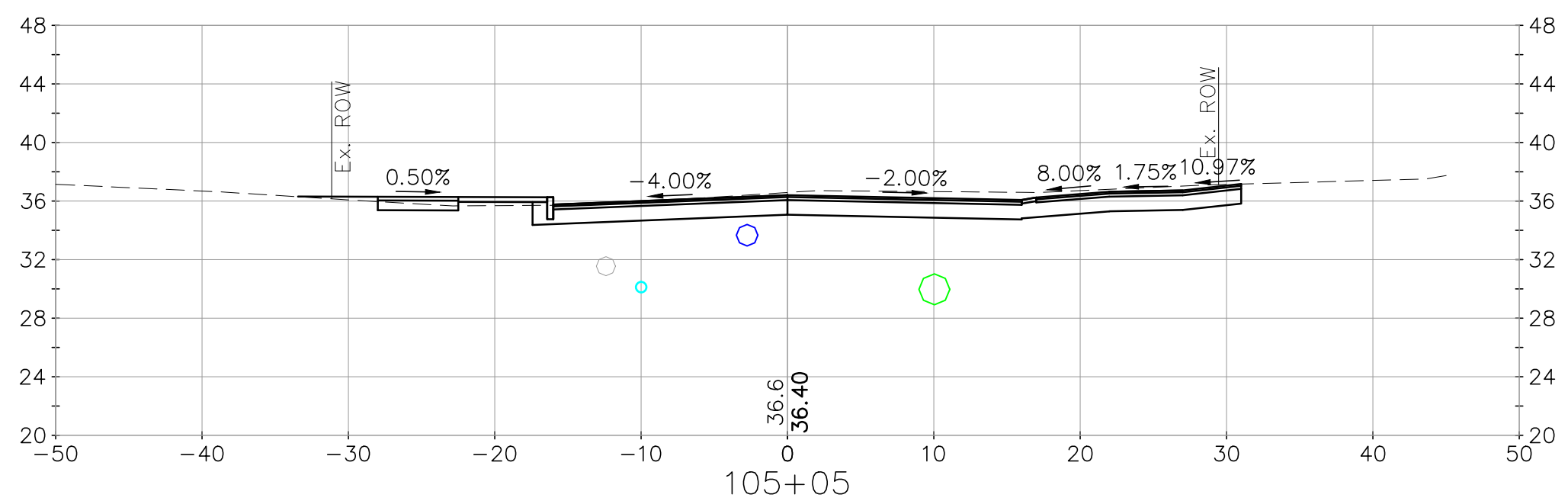
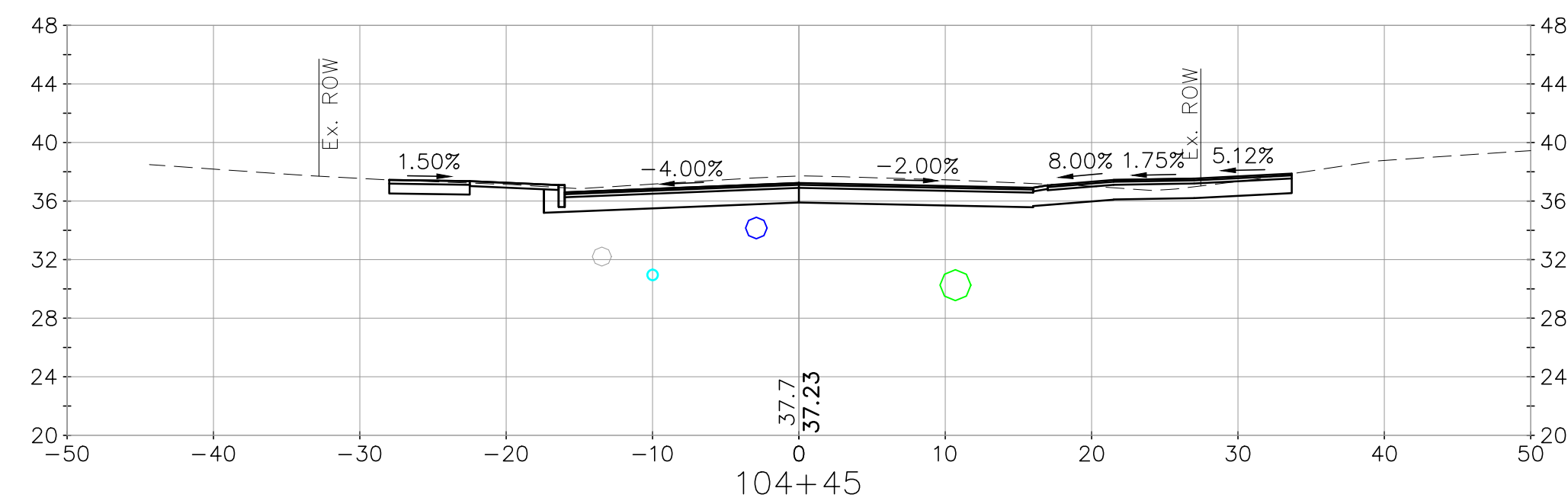
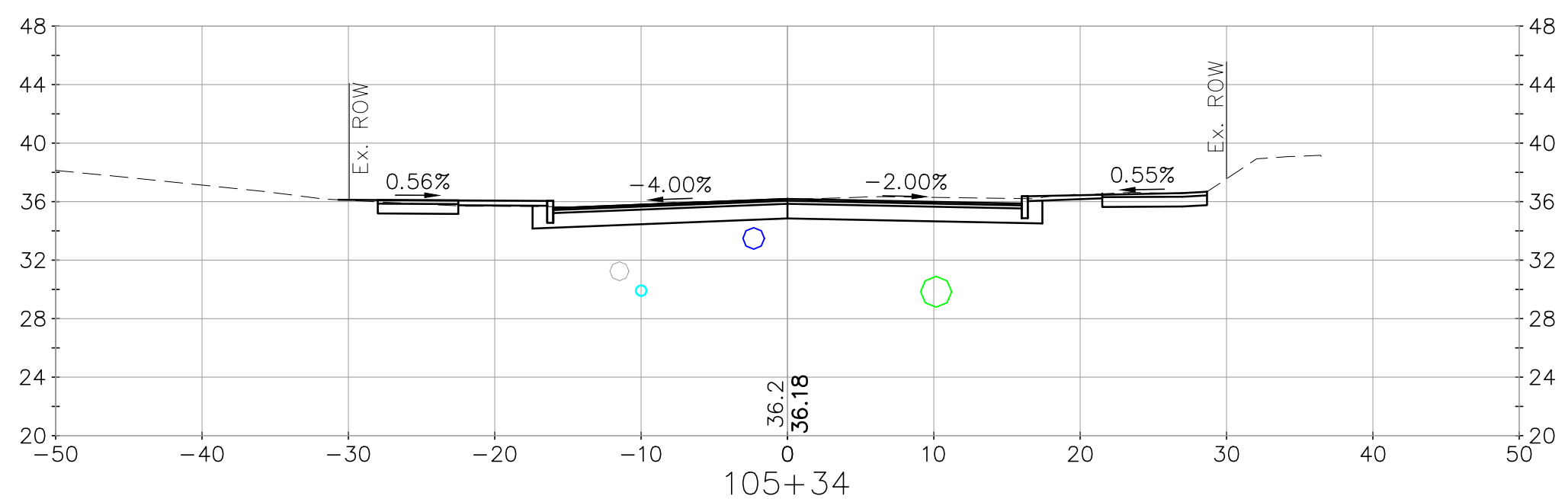
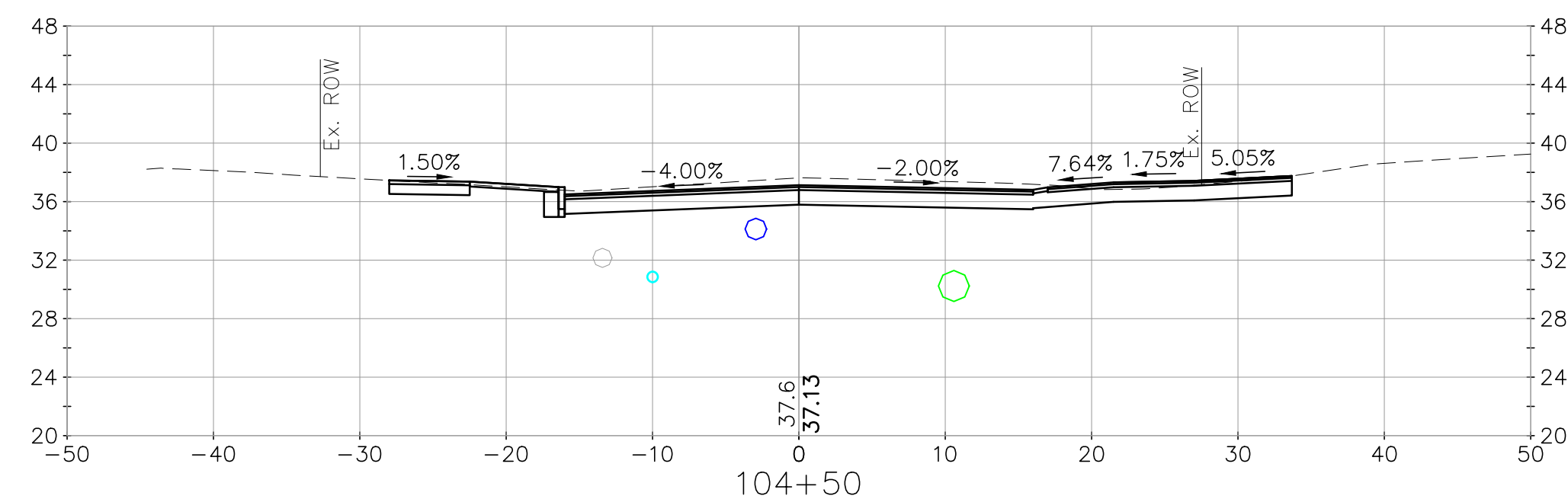
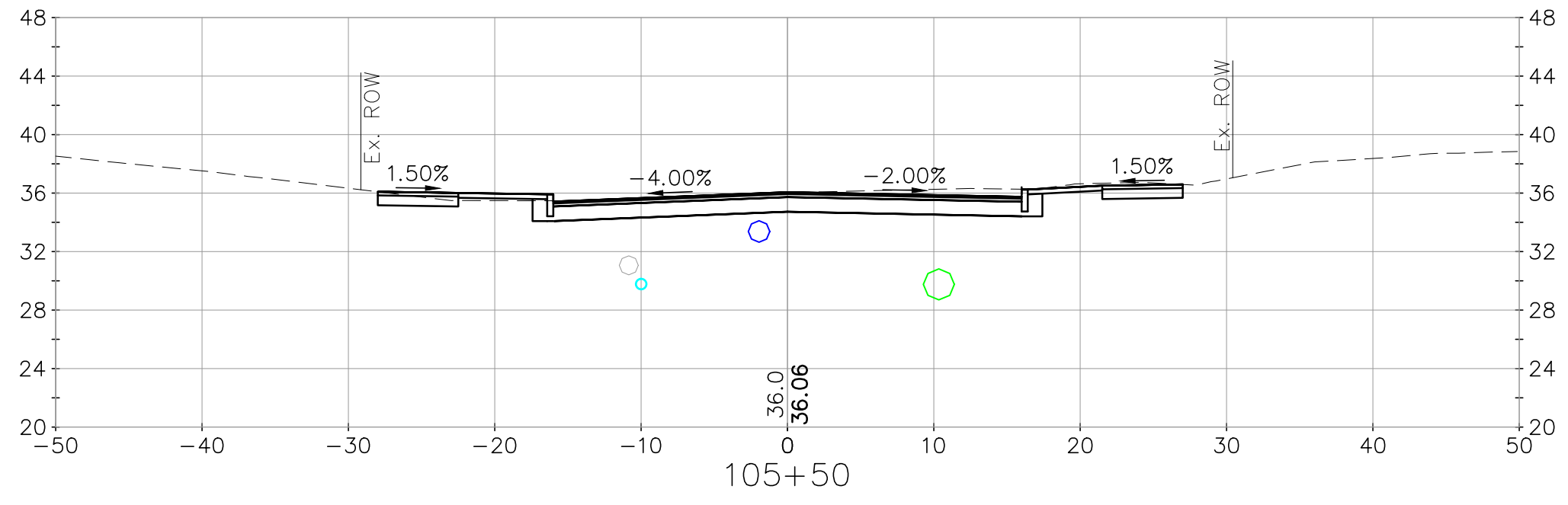
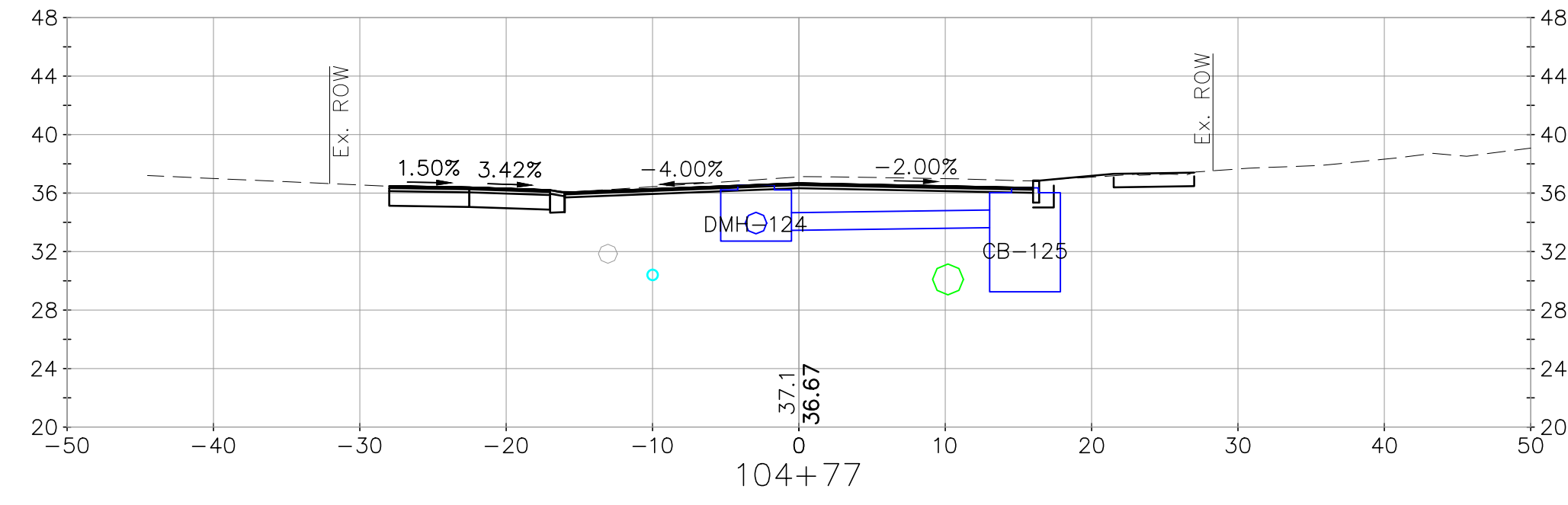
designed by:	CFC/STF	drawn by:	WWG	approved by:	PAC	date:	February 2024	project no.:	1211	checked by:	PAC	scale:	1" = 10'
<p>City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Water and Drainage Details</p>													
<p>drawing no. D-6</p>													
<p>sheet: 36 of 55</p>													



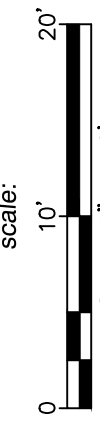


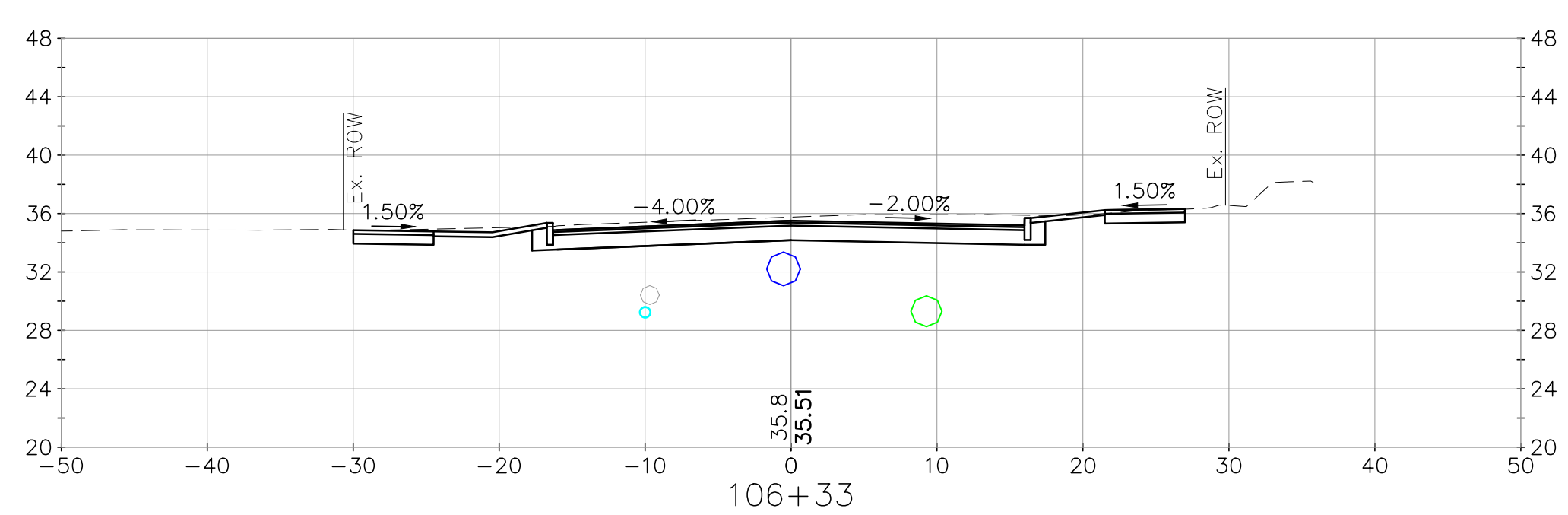
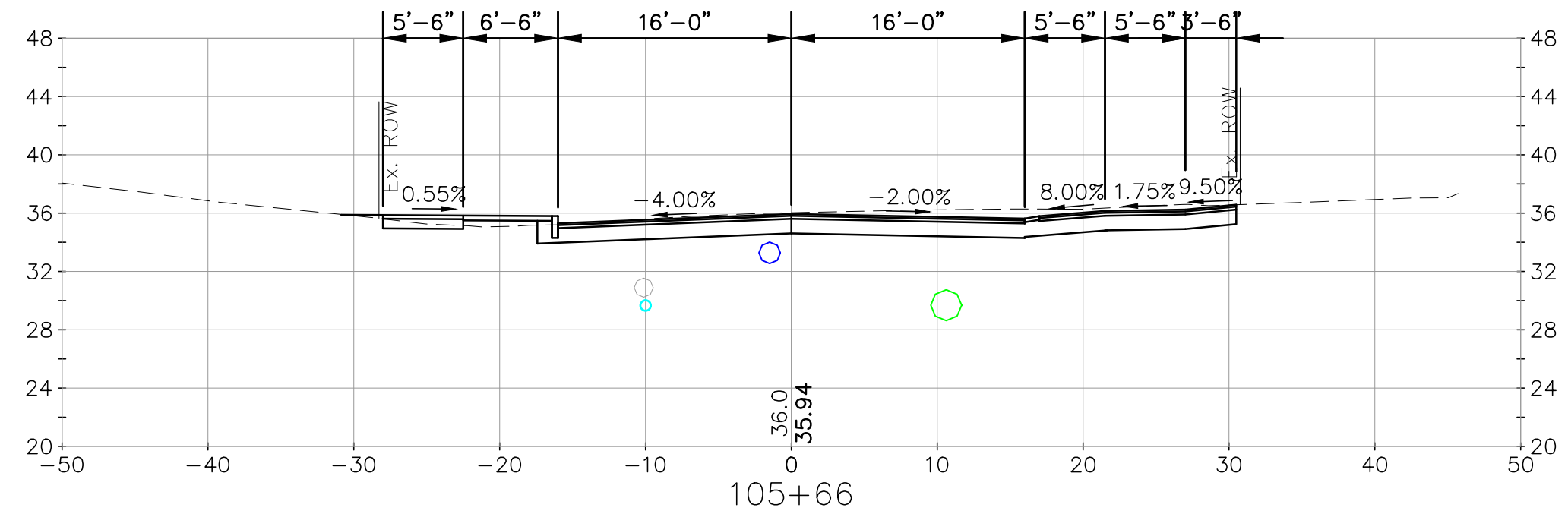
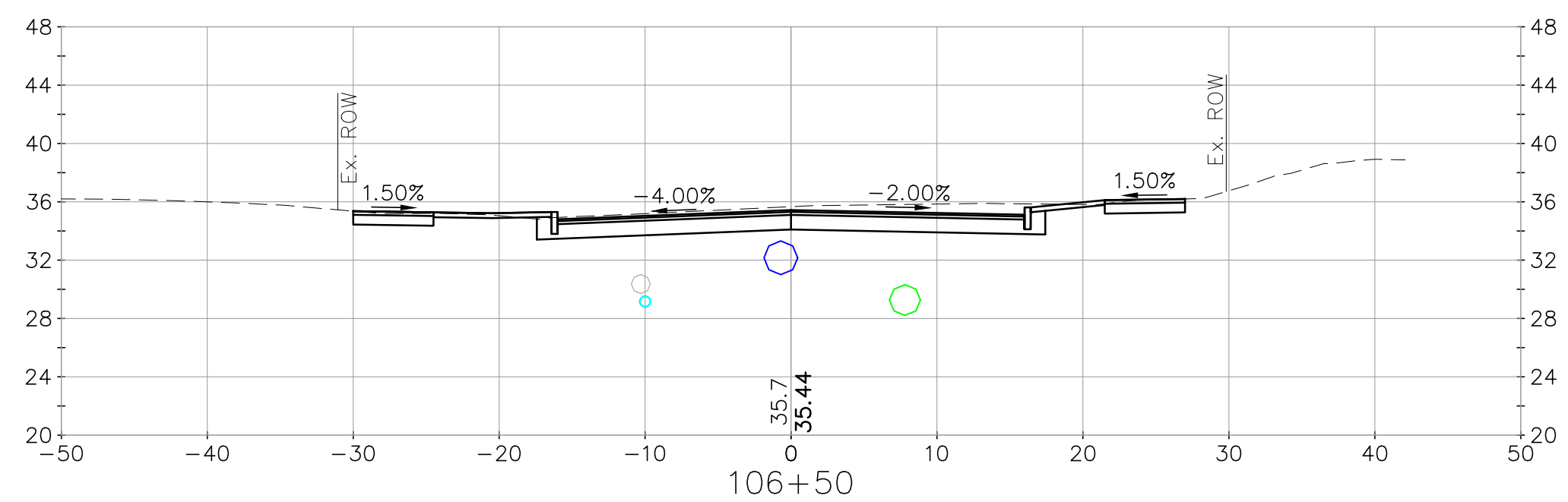
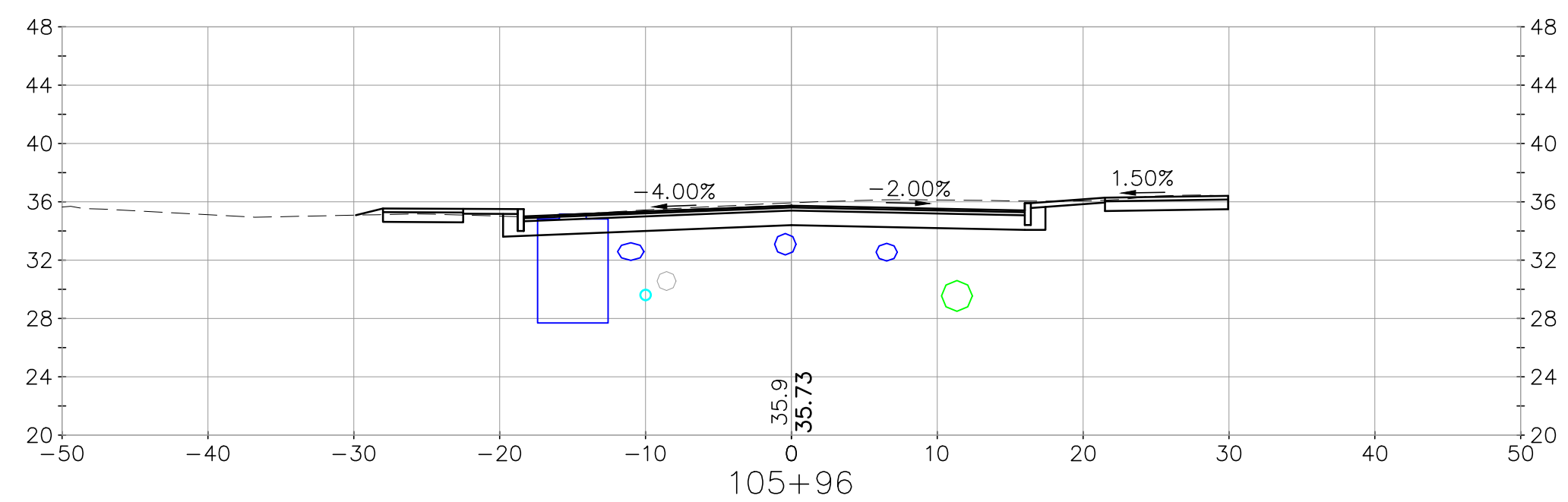
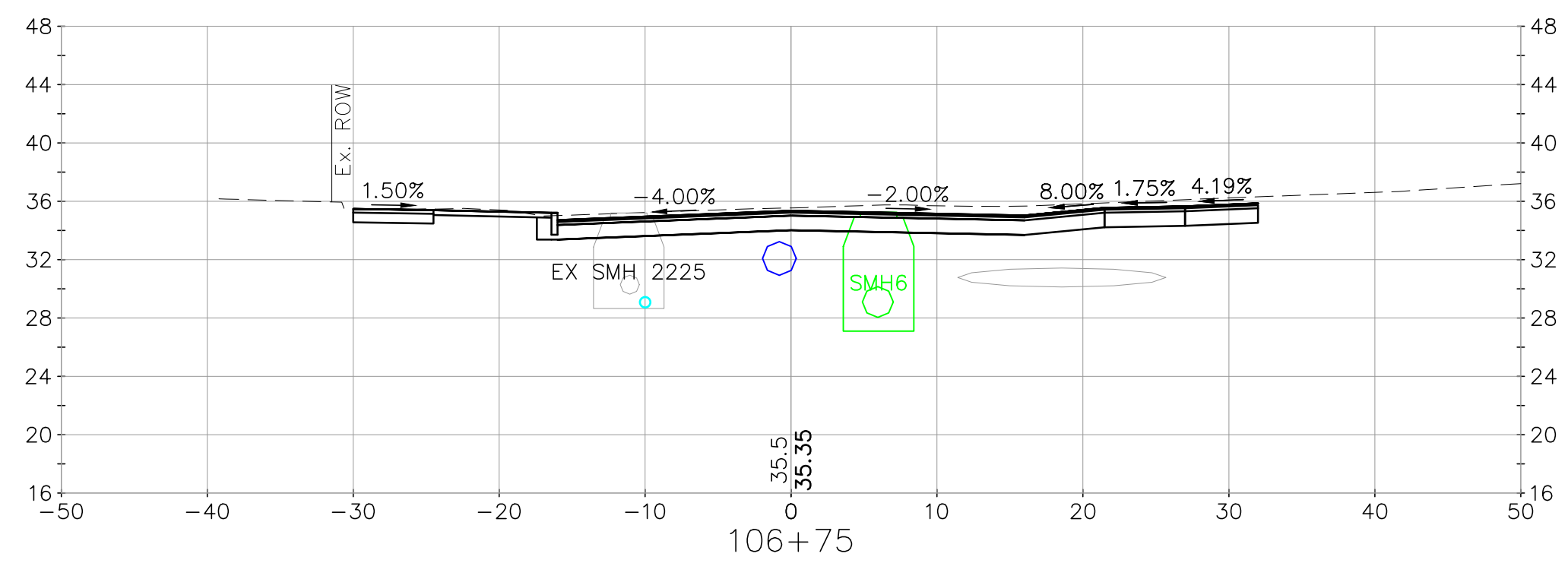
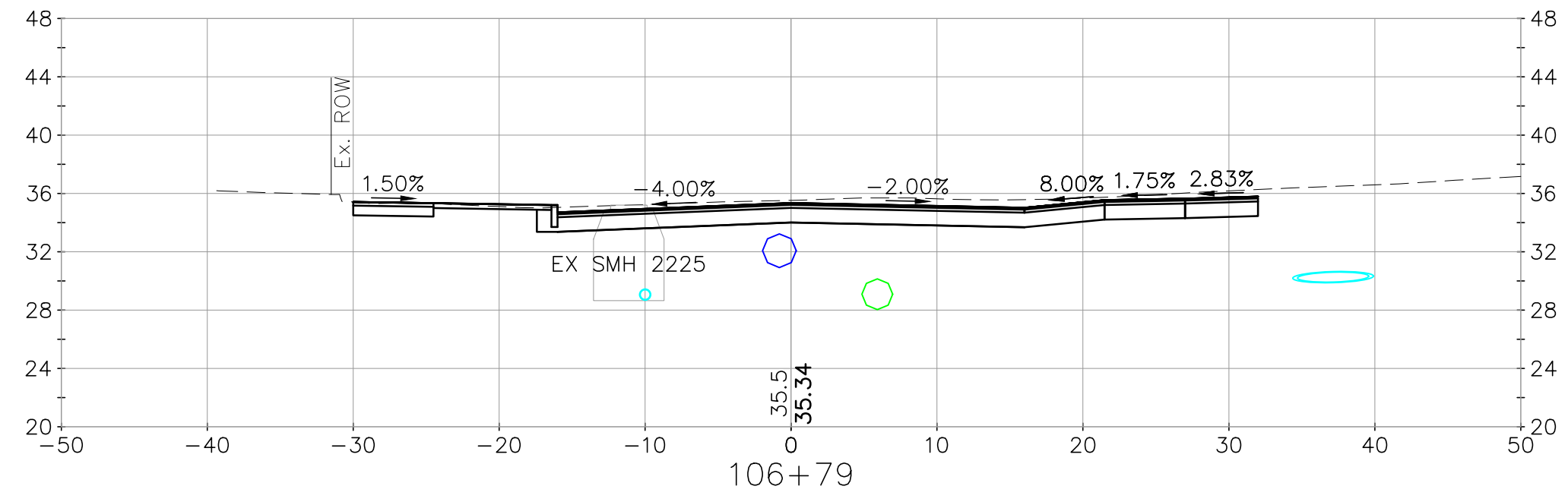
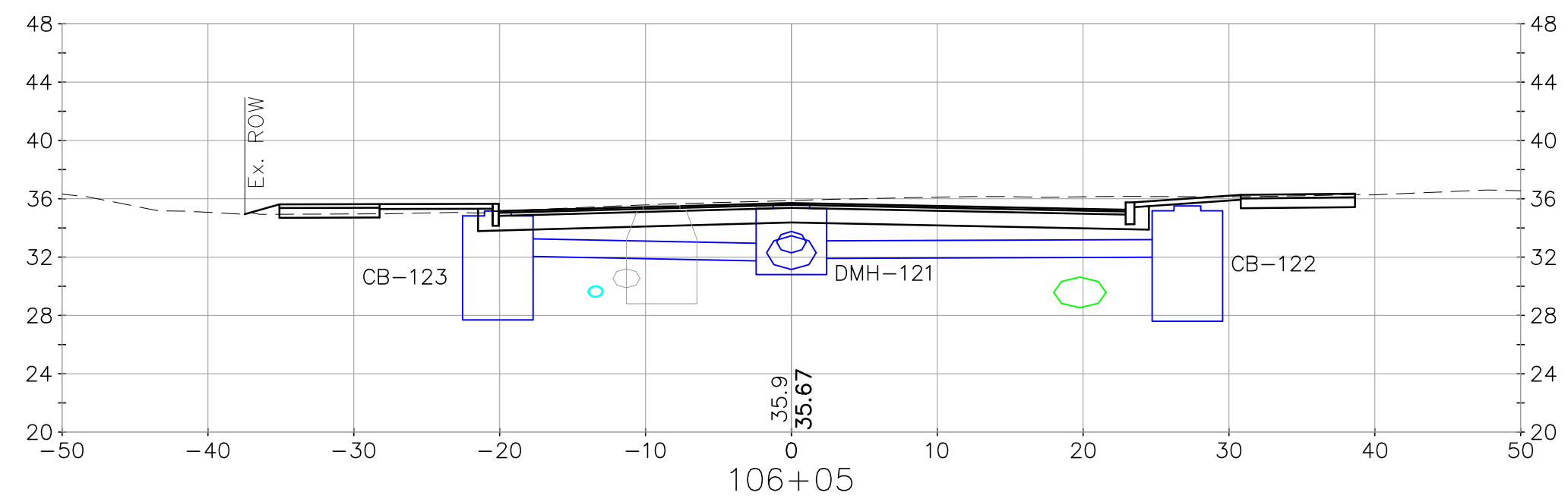
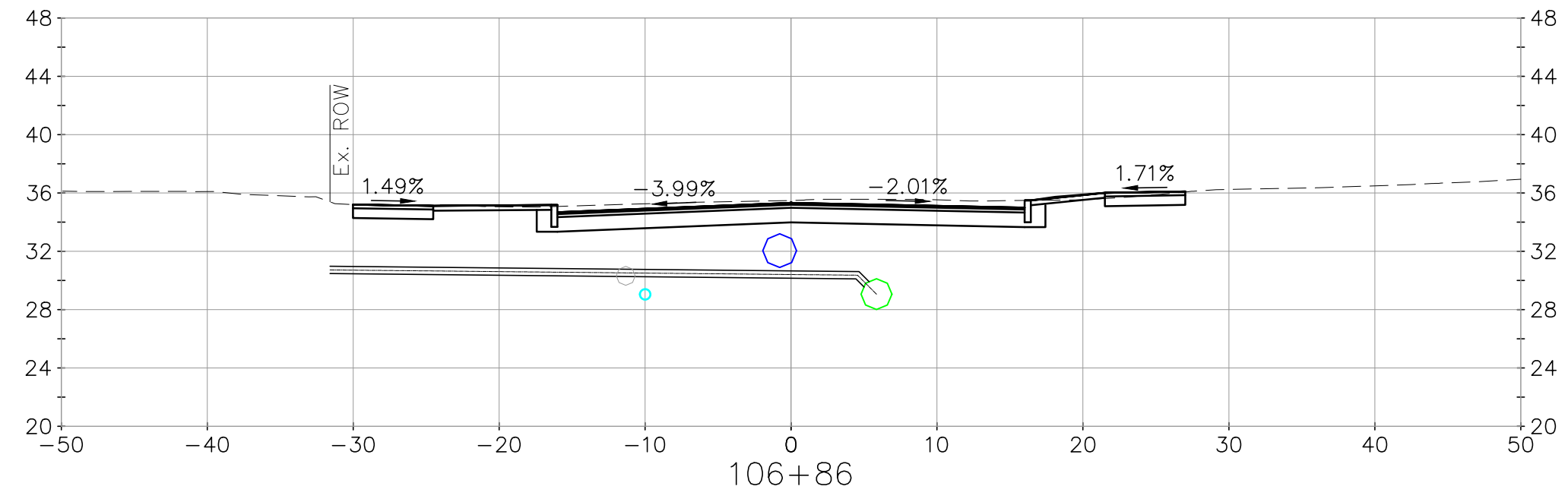
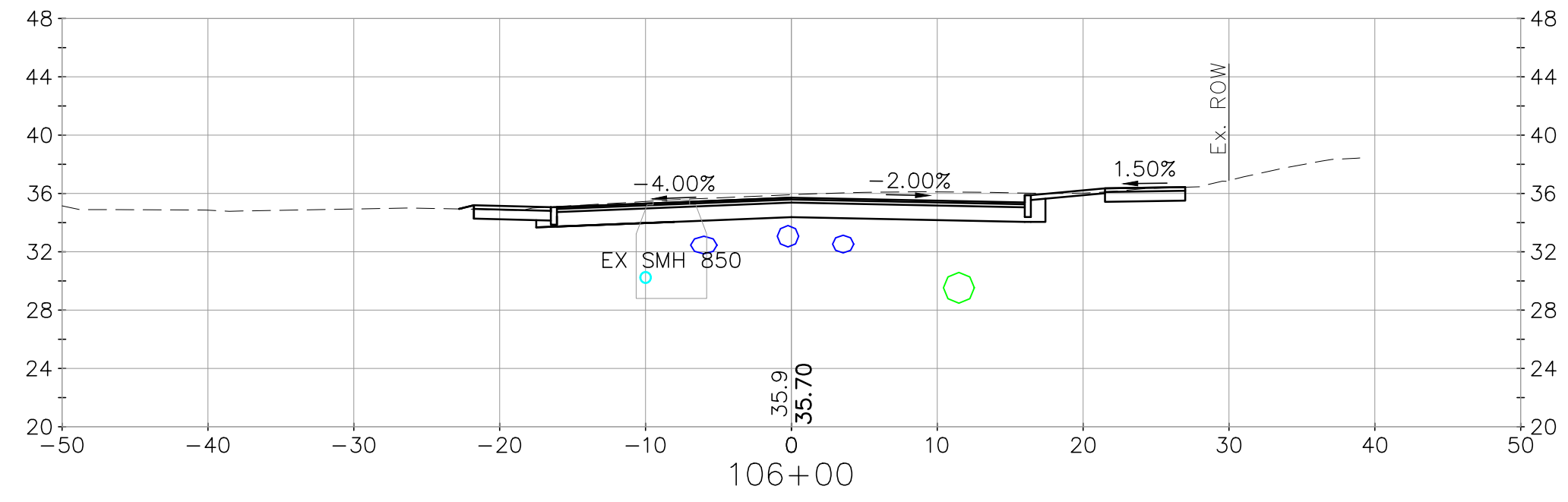
 CIVIL/ENVIRONMENTAL/STRUCTURAL		Portsmouth, NH 603/431-6196 Manchester, NH 603/627-0708 Portland, ME 207/641-4223		c m a e n g i n e e r s . c o m	
		designed by: CFC/STF	drawn by: WWG	approved by: PAC	no.
date: February 2024	project no: 1211	checked by: PAC			revision
City of Portsmouth, New Hampshire Department of Public Works			Willard Ave Area Improvement Project Cross Sections Willard Ave		
drawing no. <b>XS-1</b>					
sheet: 37 of 55					
					1 Issued for Bid
					2/2/2024
					by



<p><b>CMA ENGINEERS</b>          CIVIL/ENVIRONMENTAL/STRUCTURAL          Portsmouth, NH 603/431-6196          Manchester, NH 603/627-0708          Portland, ME 207/641-4223</p>		<p>1 Issued for Bid</p>	<p>2/2/2024</p>
<p>City of Portsmouth, New Hampshire          Department of Public Works          Willard Ave Area          Improvement Project          Cross Sections          Willard Ave</p>		<p>designed by: CFC/SJF          drawn by: WWG          approved by: PAC</p>	<p>date: February 2024          project no: 1211          checked by: PAC</p>
<p>drawing no. <b>XS-2</b></p>		<p>scale: 1" = 10'          0 10' 20'</p>	<p>revision no. date 1 2/2/2024</p>
<p>sheet: 38 of 55</p>		<p>no. date</p>	



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 2/2/2024		
date: February 2024 project no: 1211 checked by: PAC	designed by: CFC/SIF drawn by: WWG approved by: PAC	scale: 1" = 10' 20' 
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Cross Sections Willard Ave		
drawing no. <b>XS-3</b>		
sheet: 39 of 55		



revision	no.	date	by
1	Issued for Bid	2/2/2024	PAC

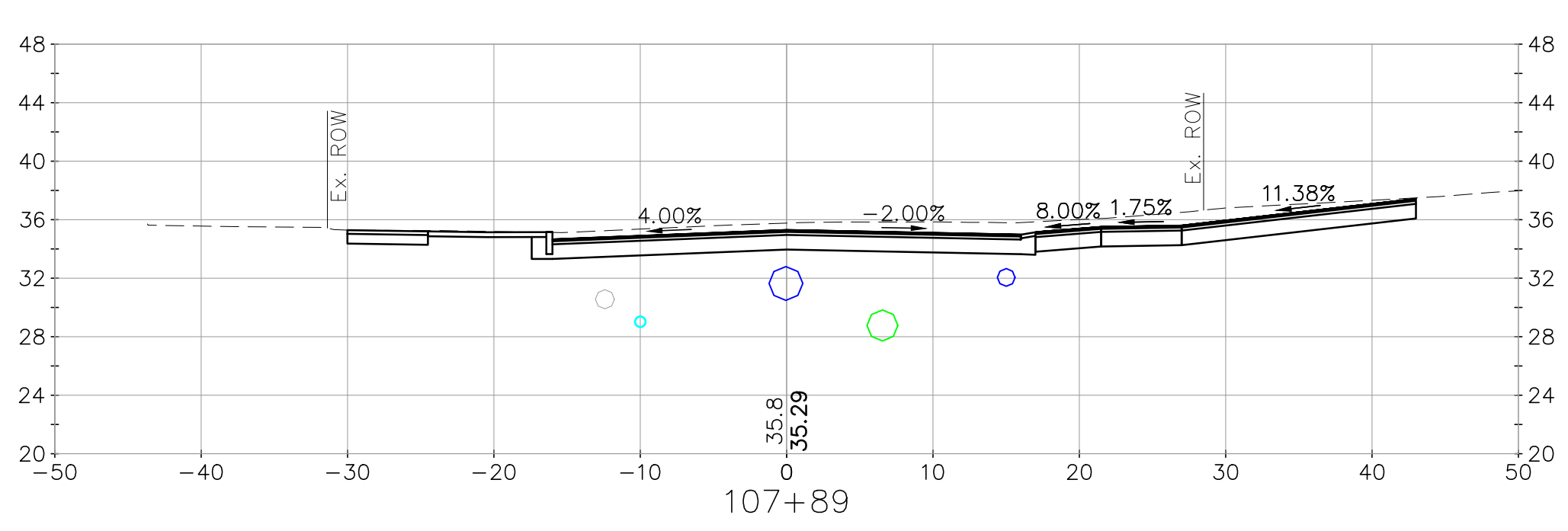
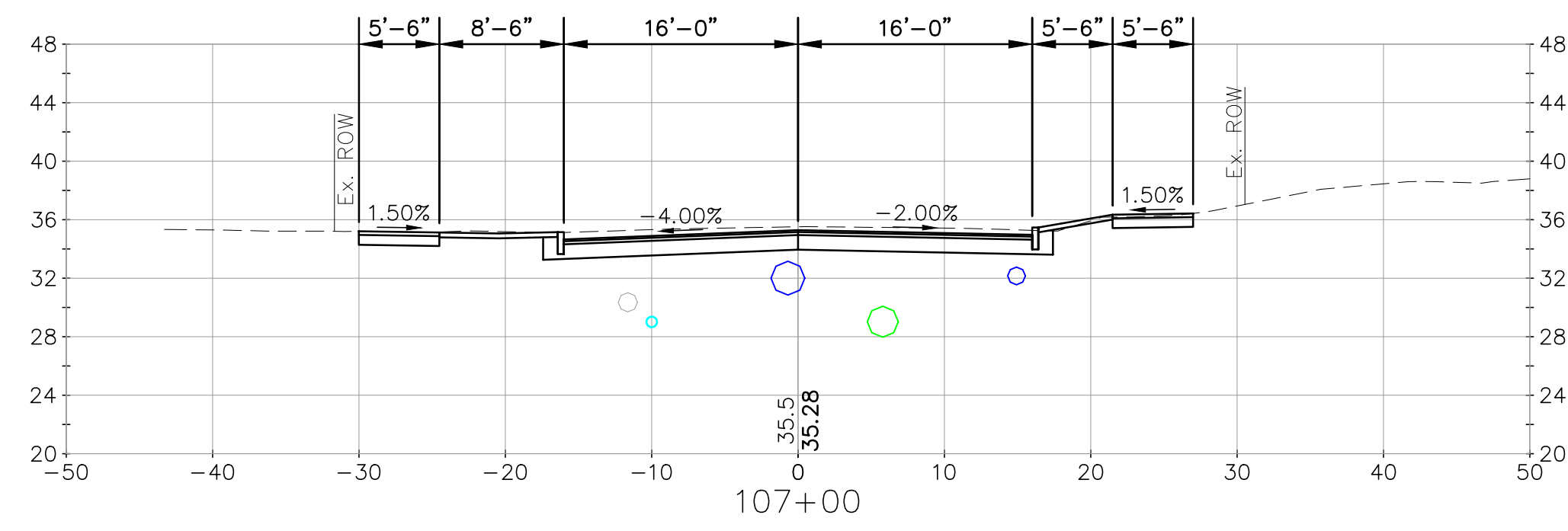
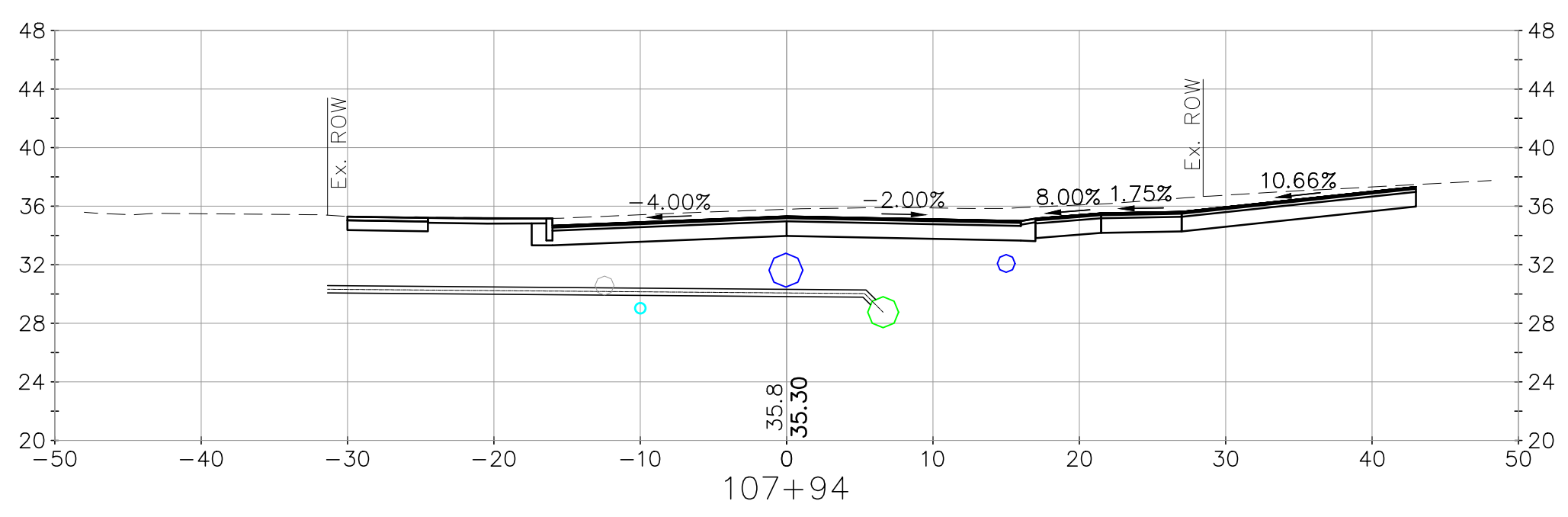
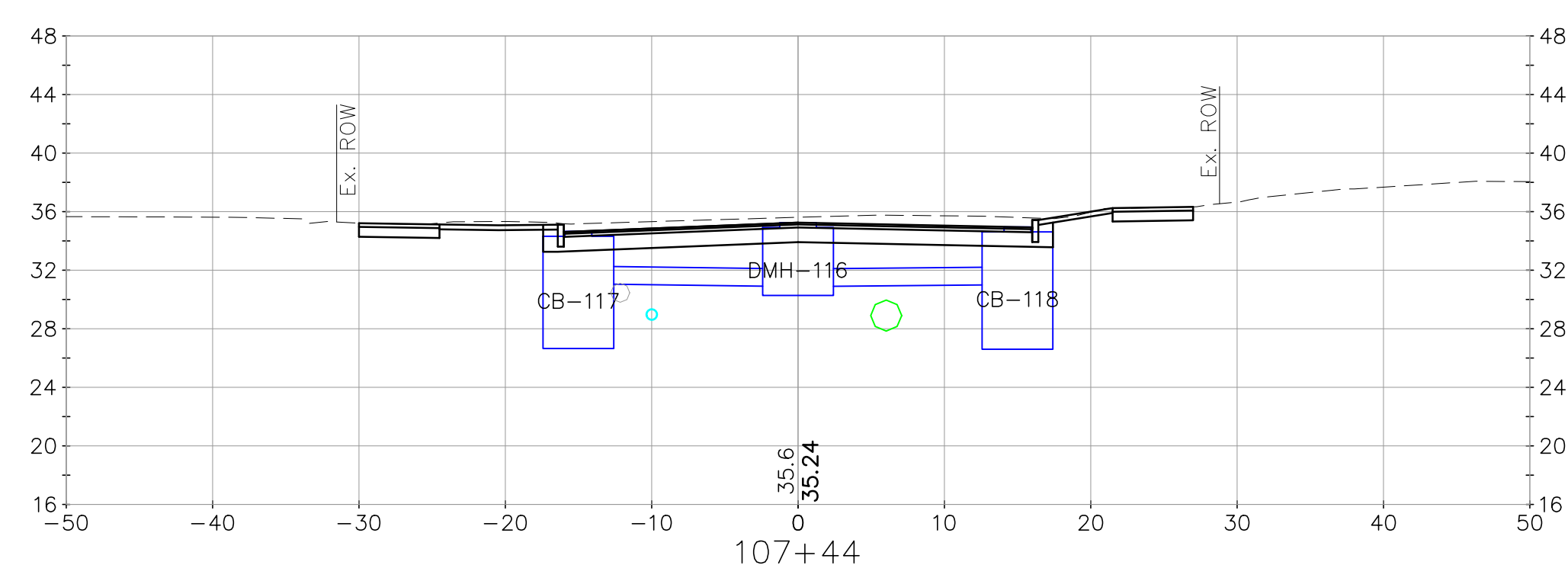
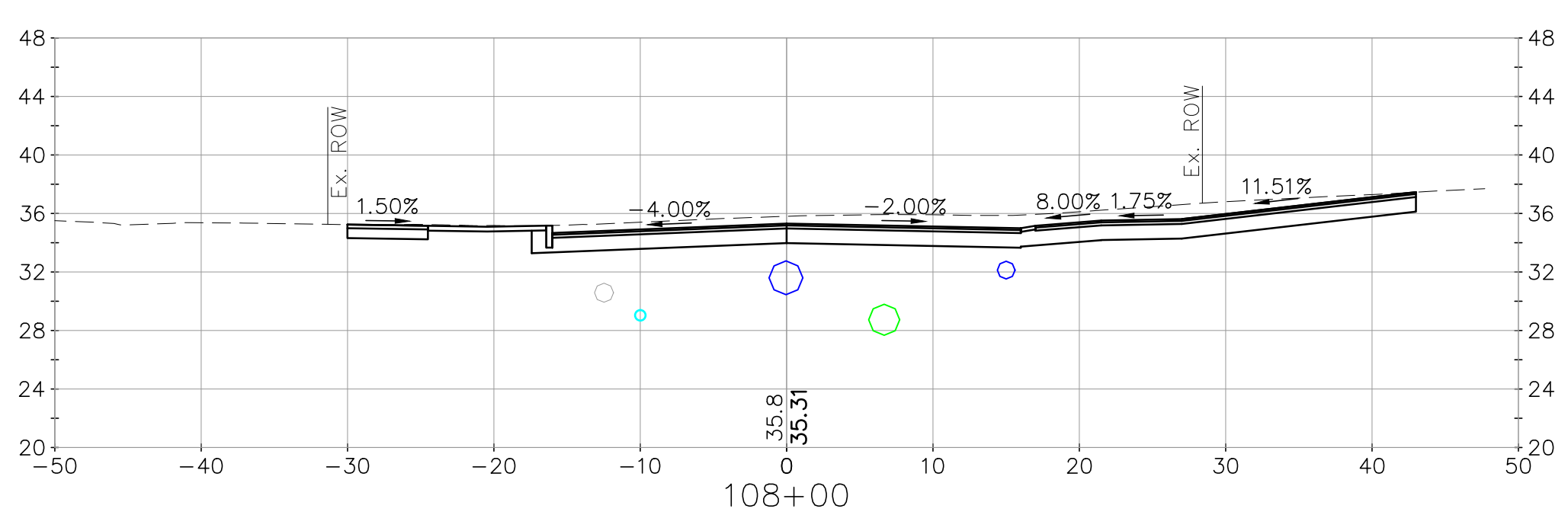
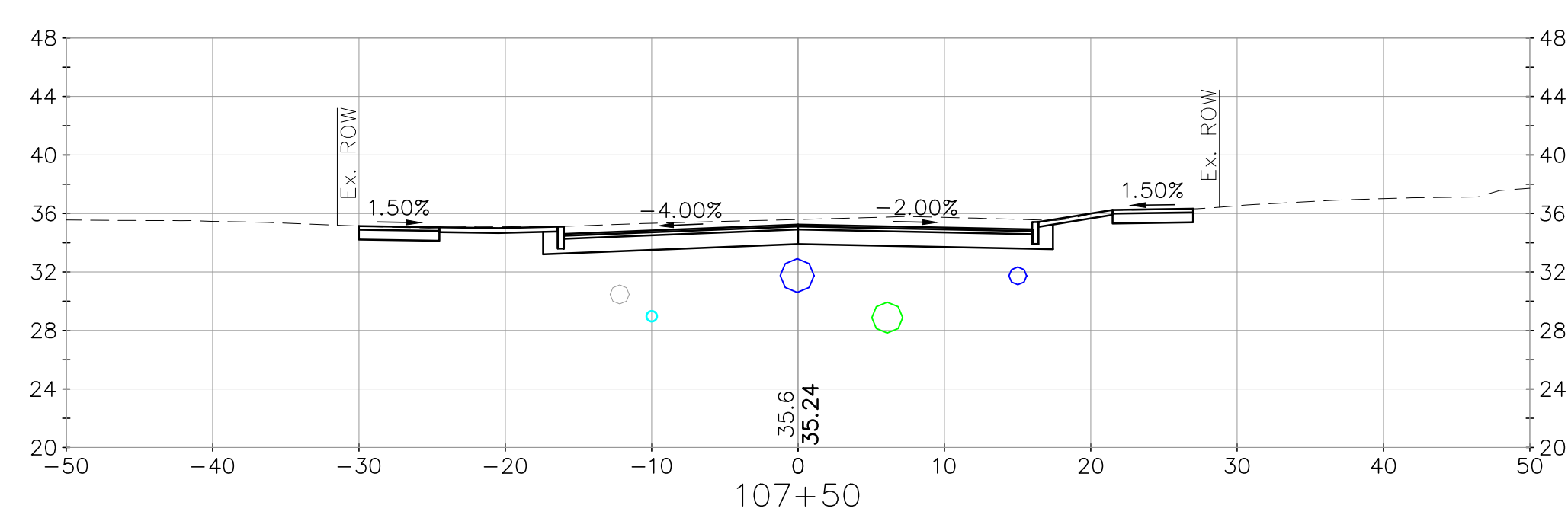
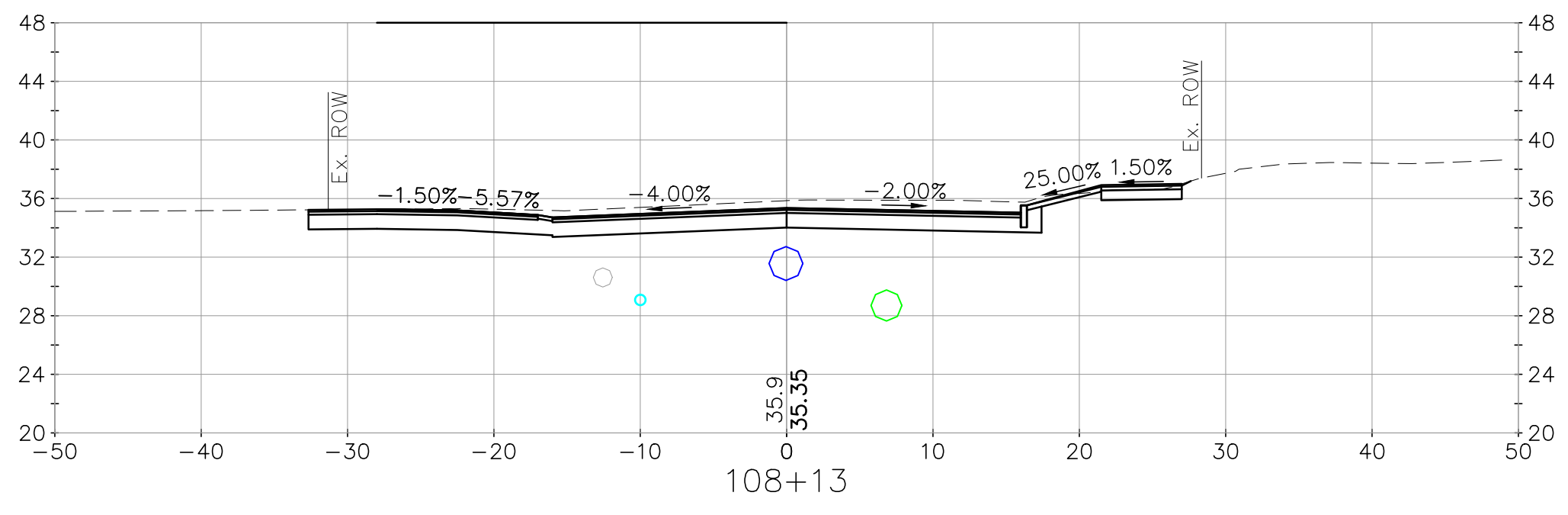
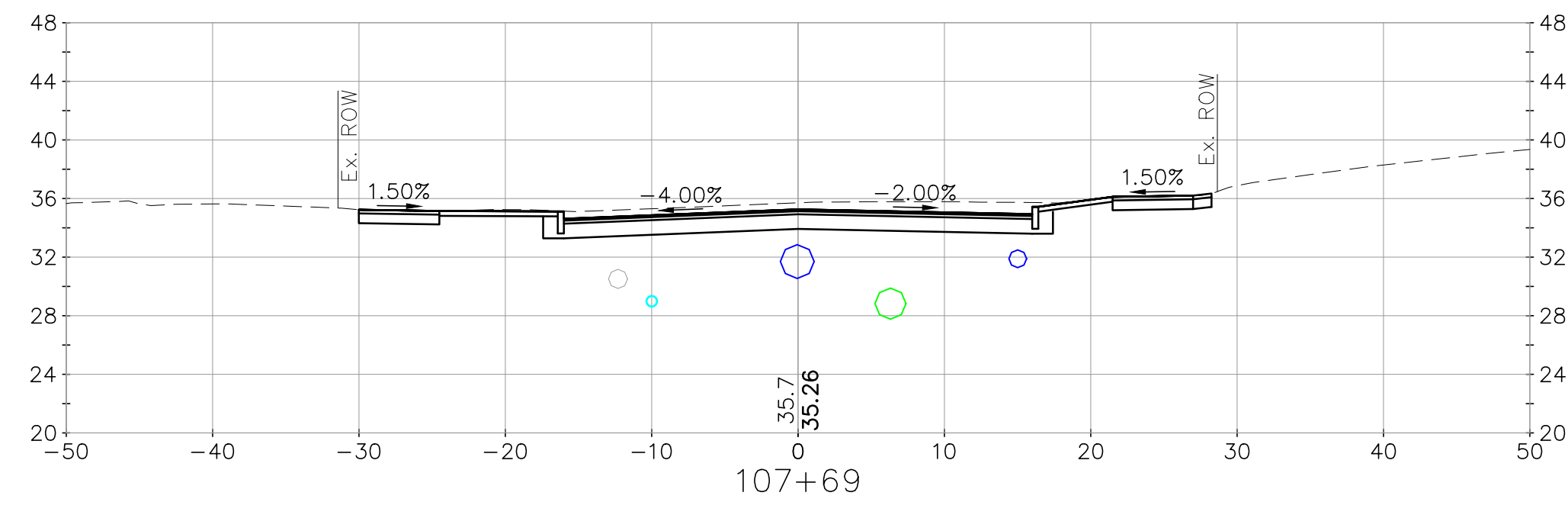
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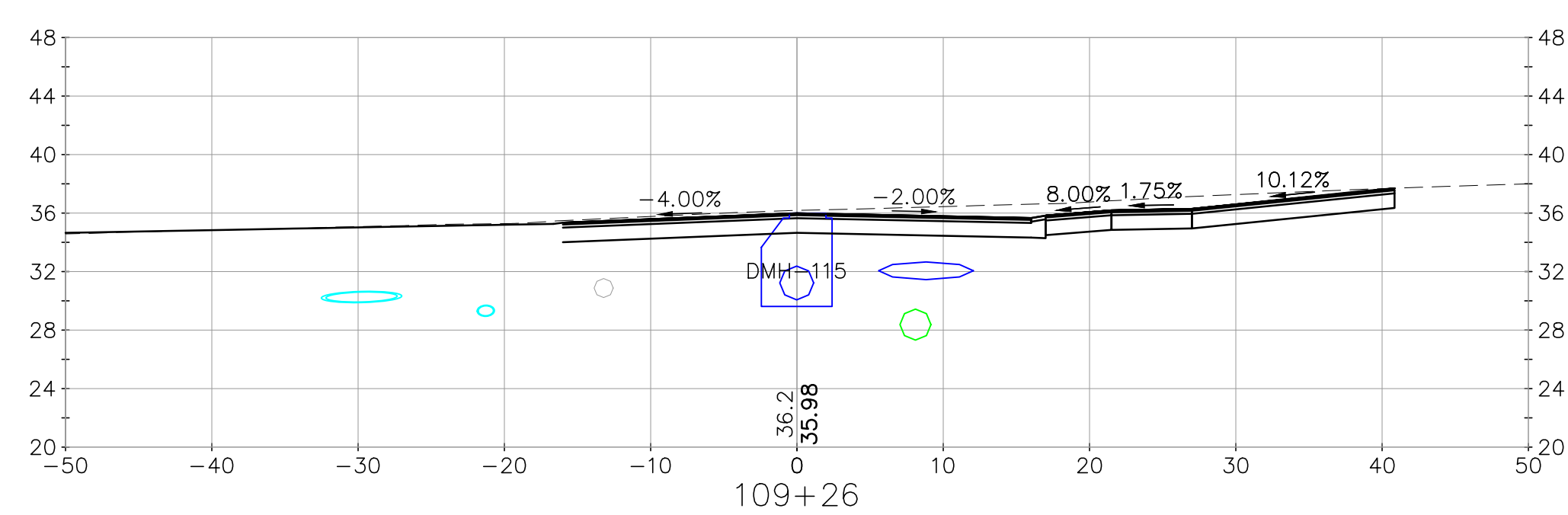
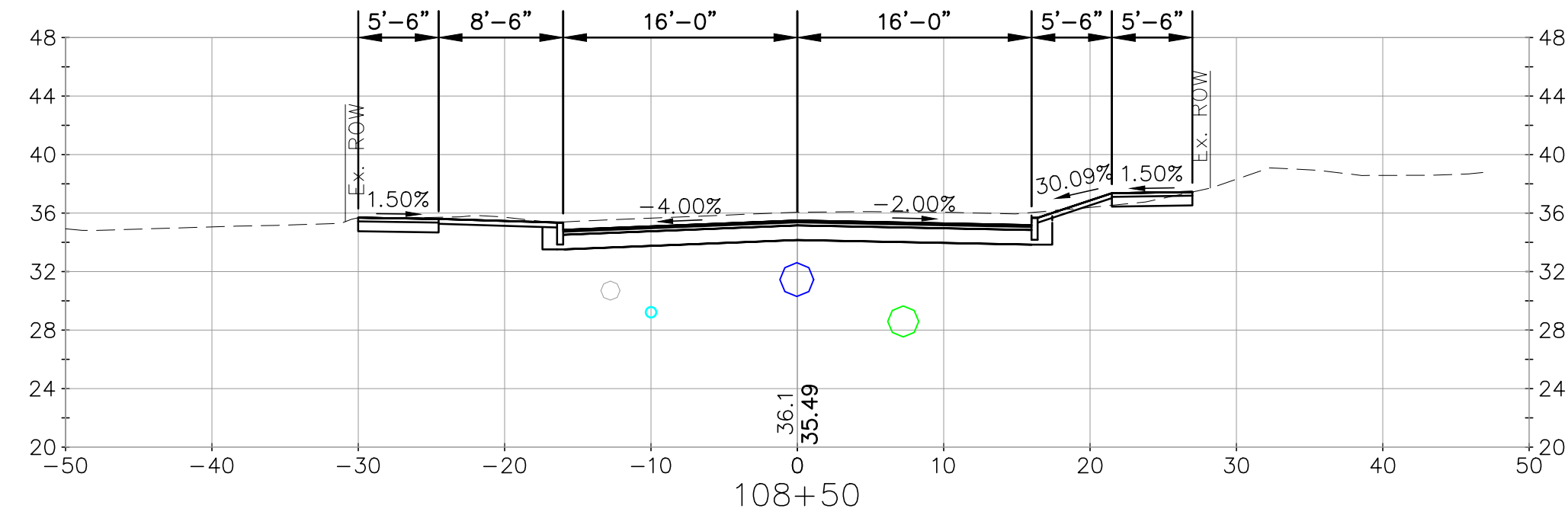
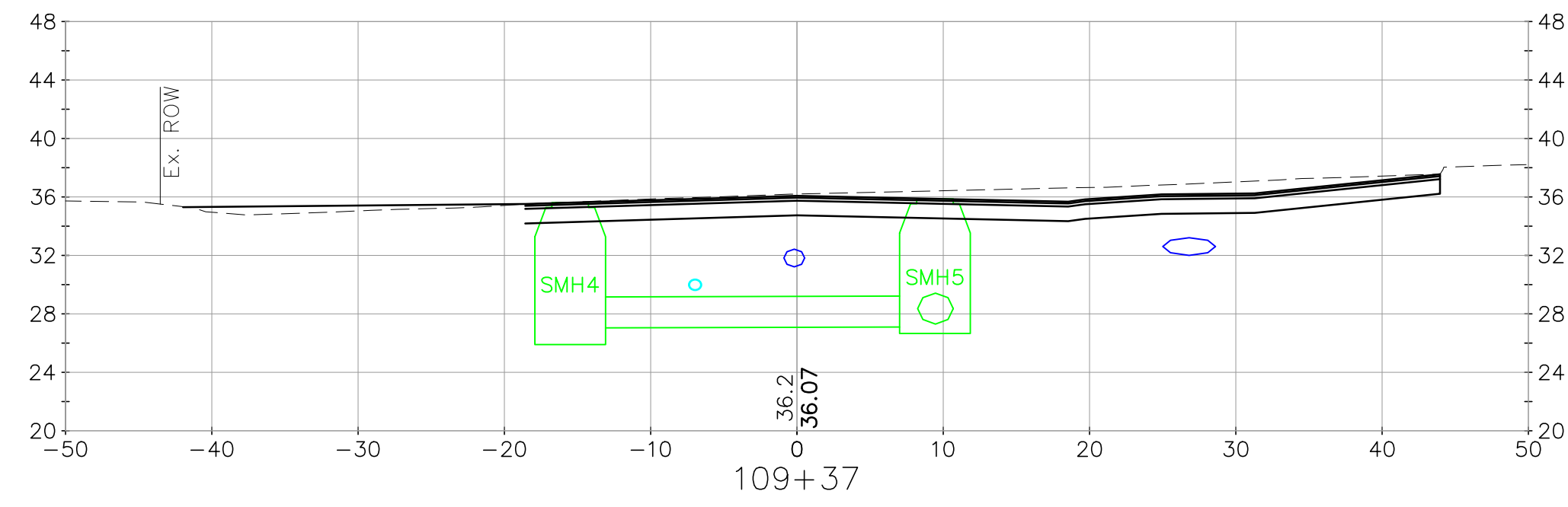
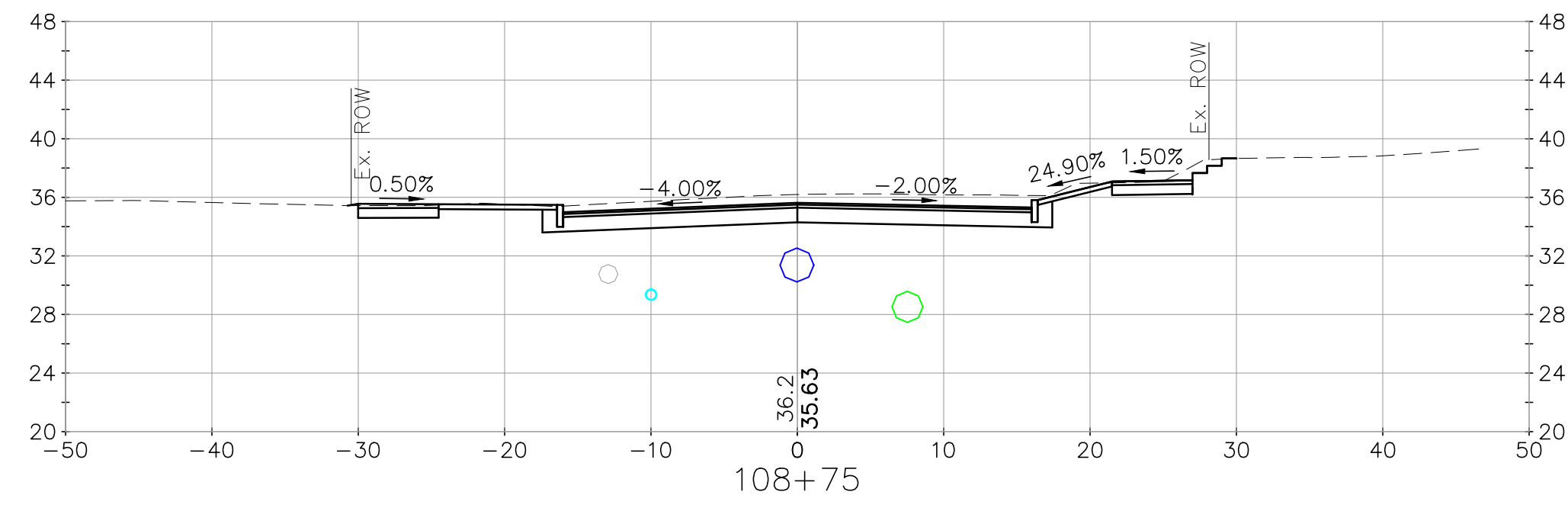
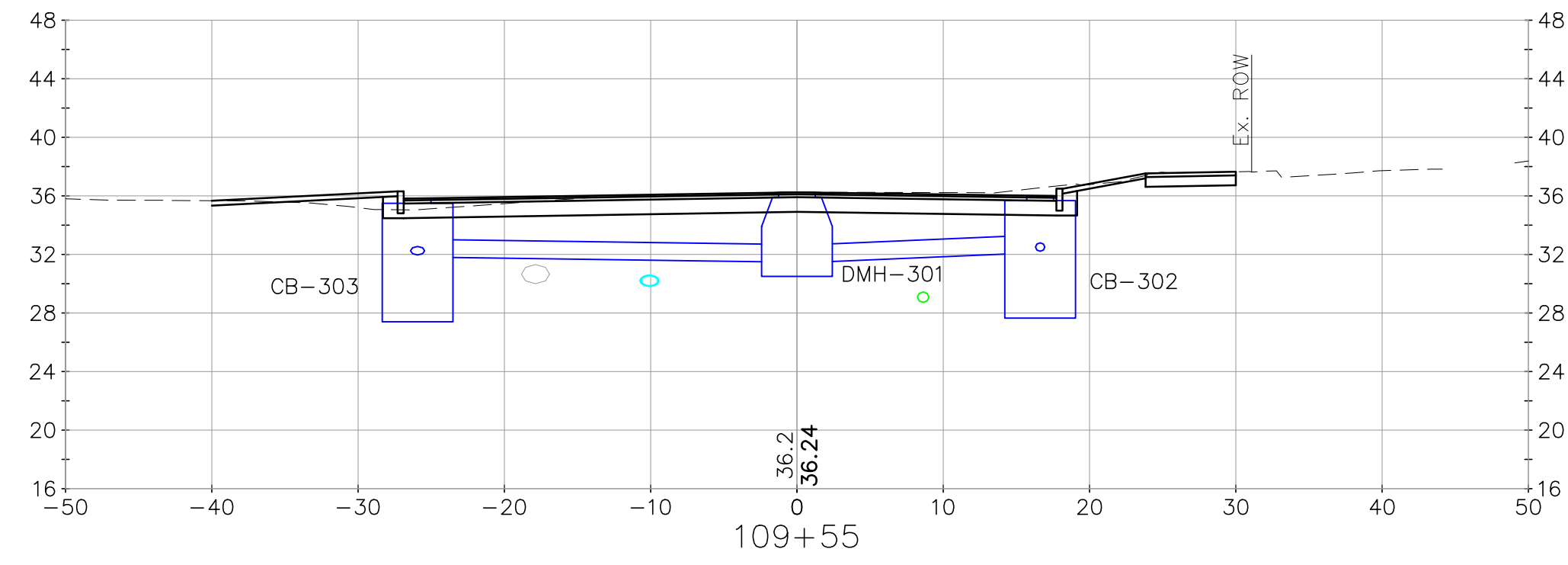
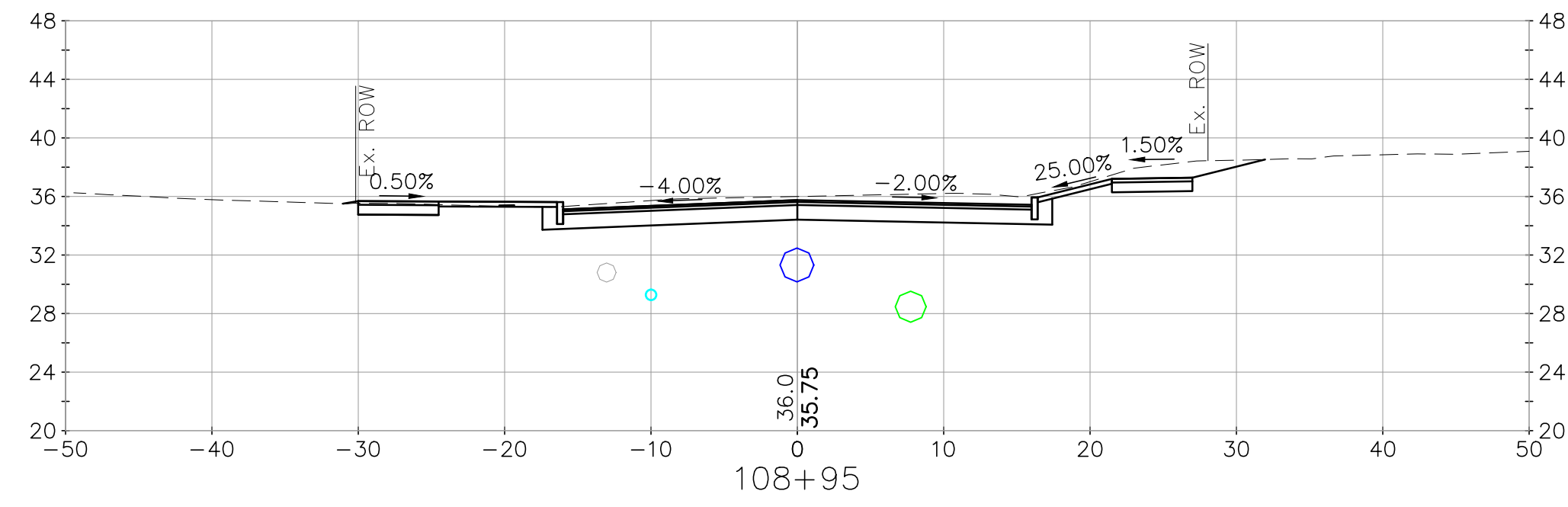
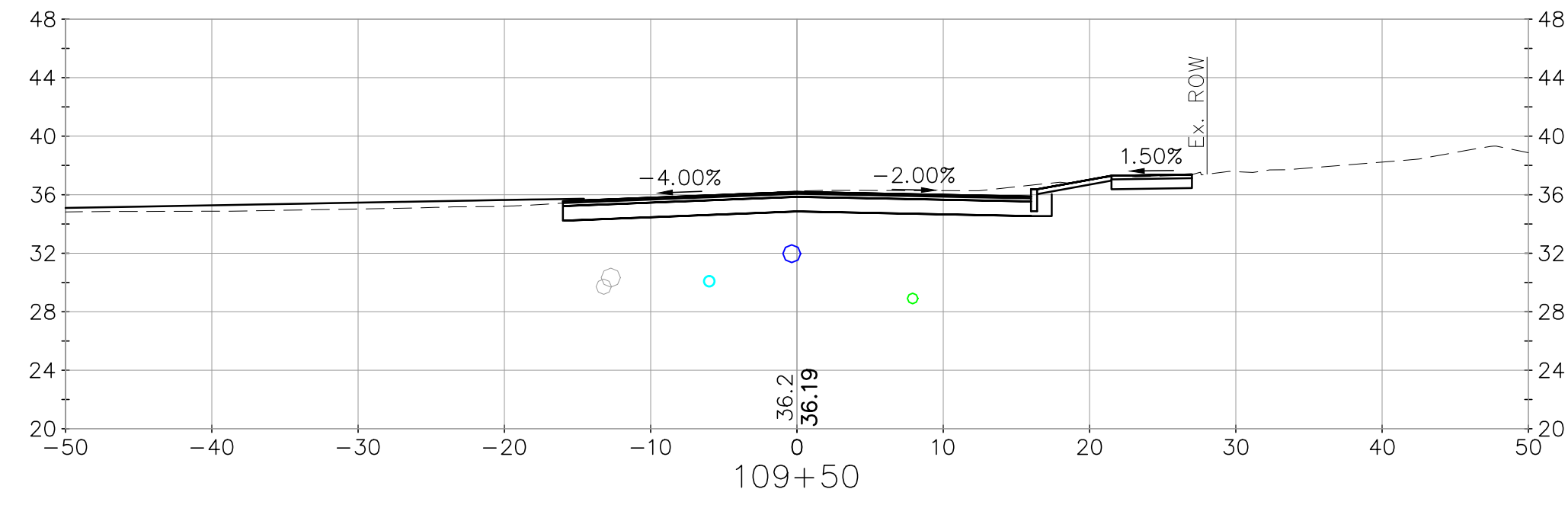
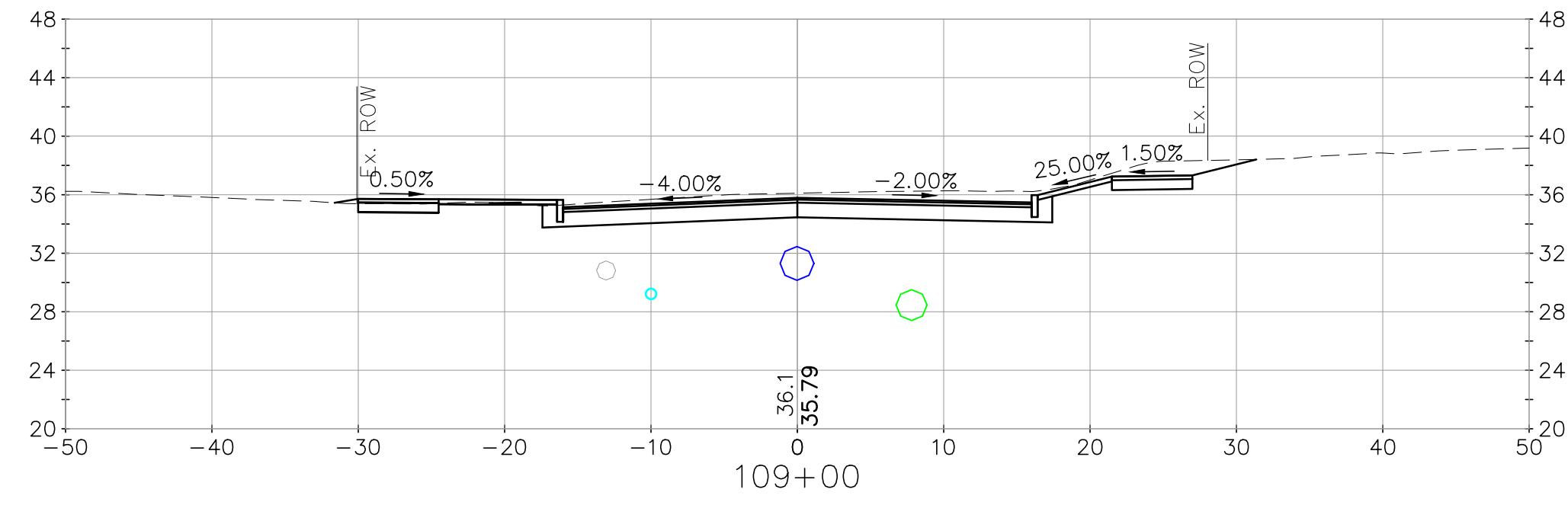
date:	February 2024
project no.:	1211
designed by:	CFC/STF
drawn by:	WVG
checked by:	PAC
approved by:	PAC
scale:	1" = 10'

City of Portsmouth, New Hampshire  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Cross Sections  
 Willard Ave

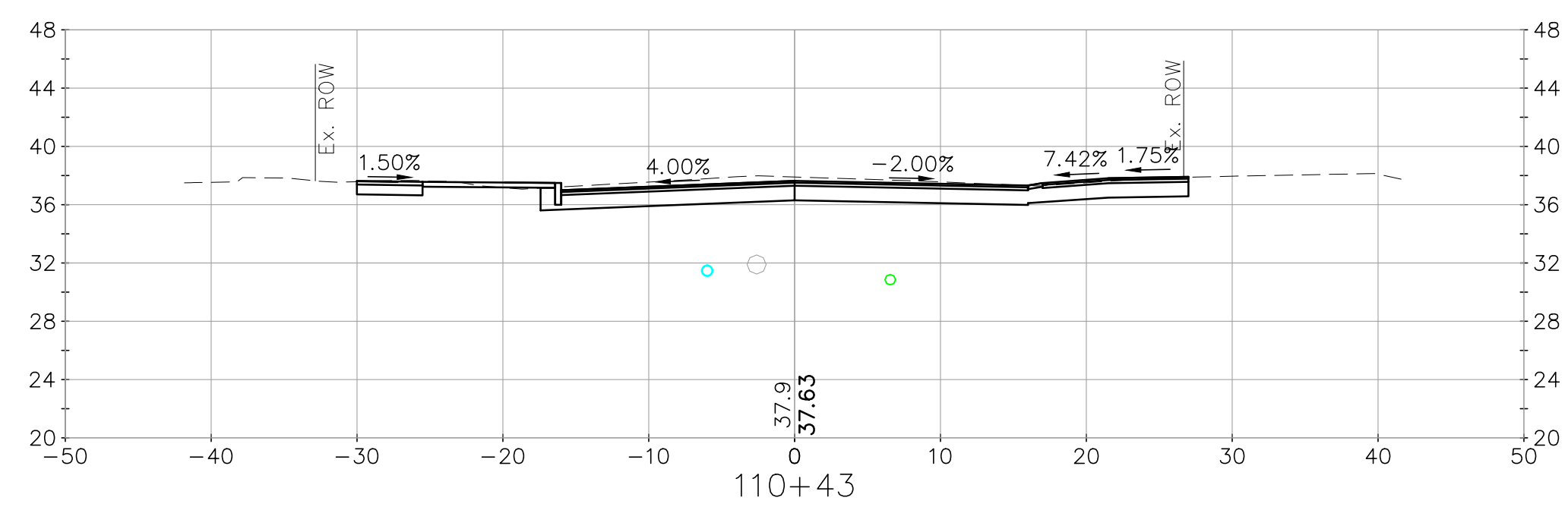
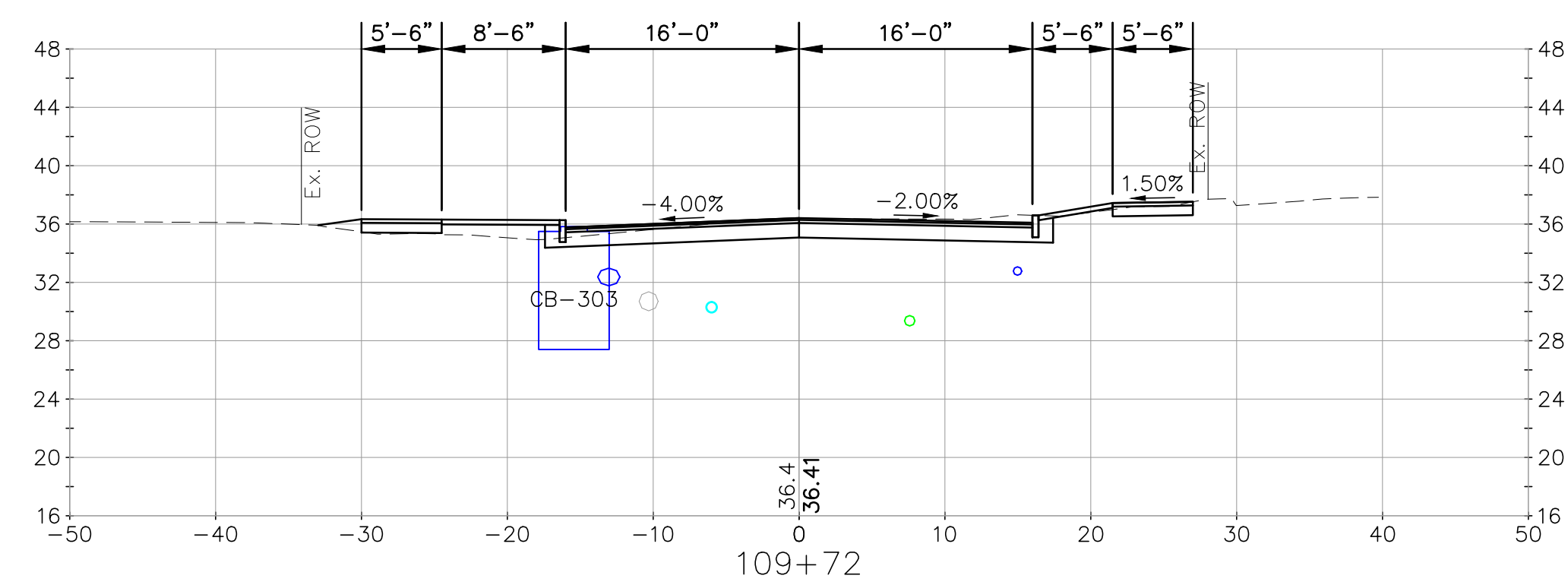
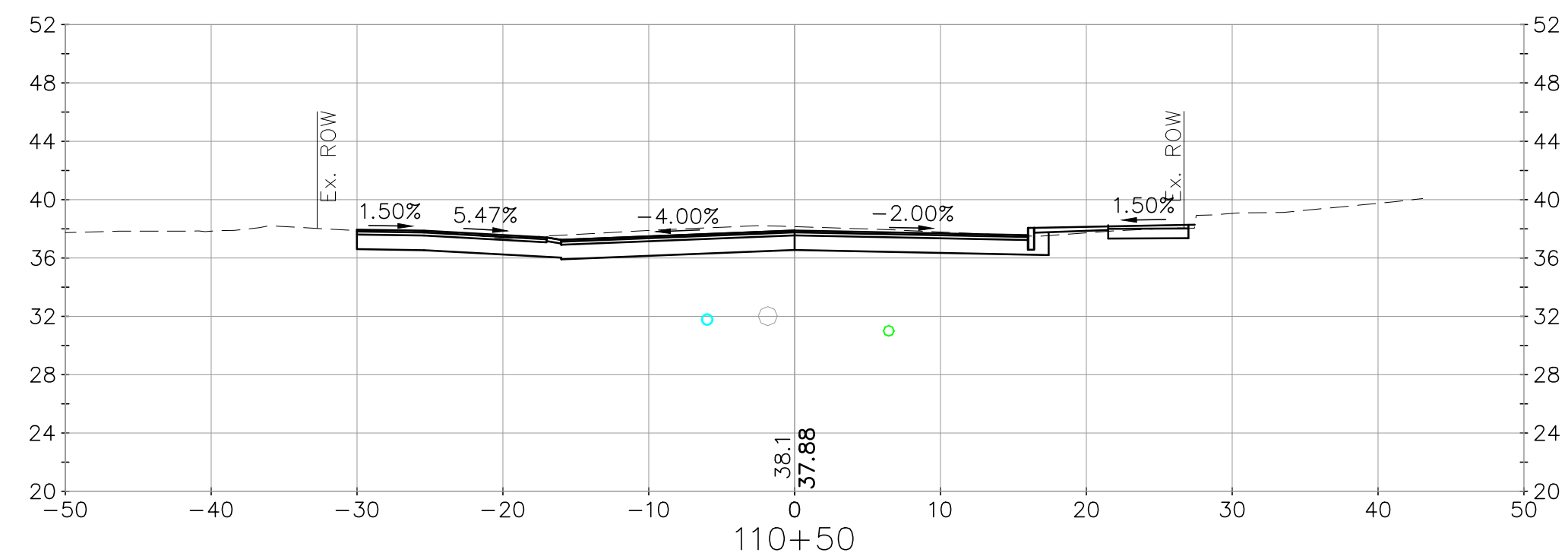
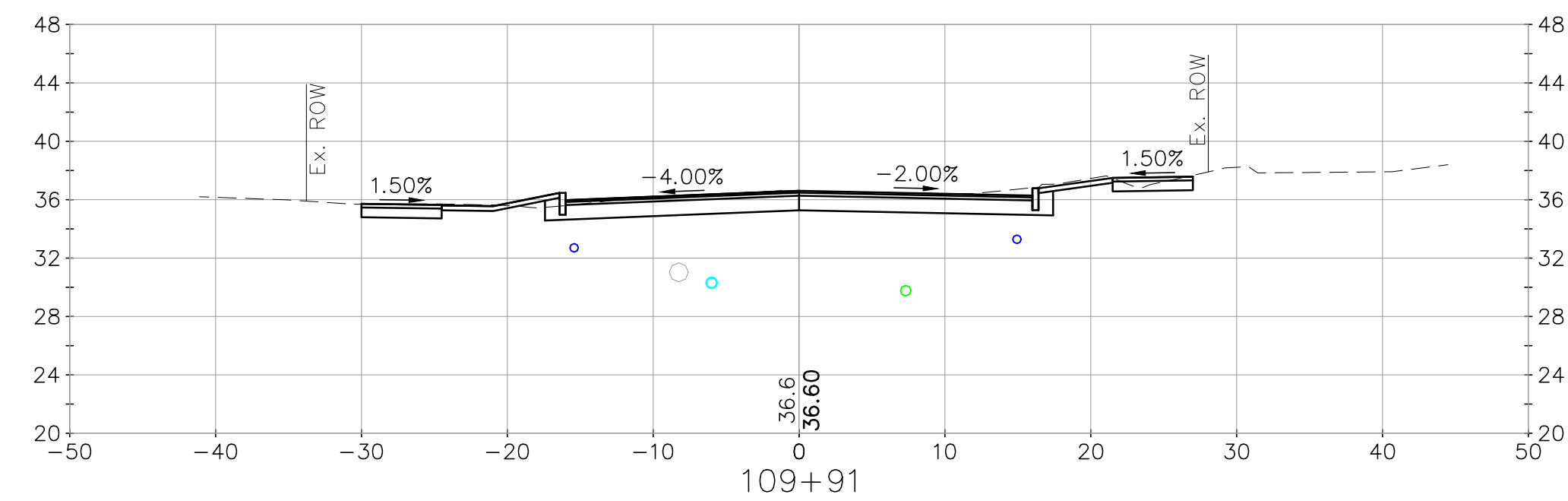
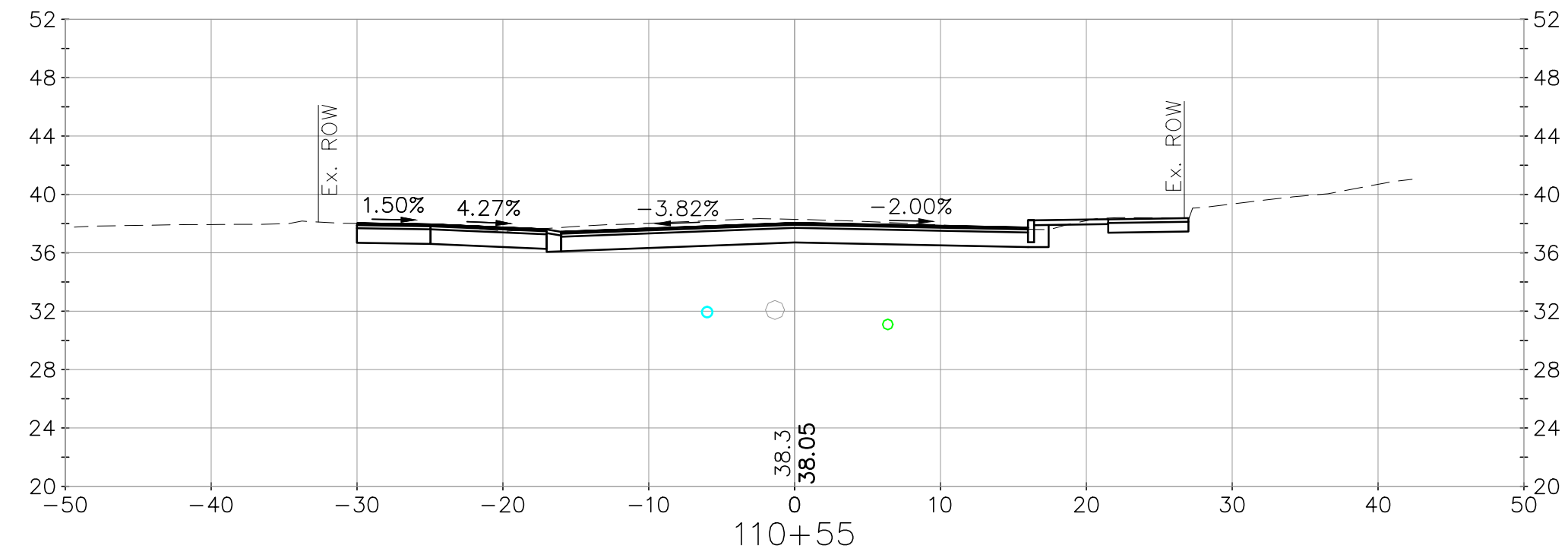
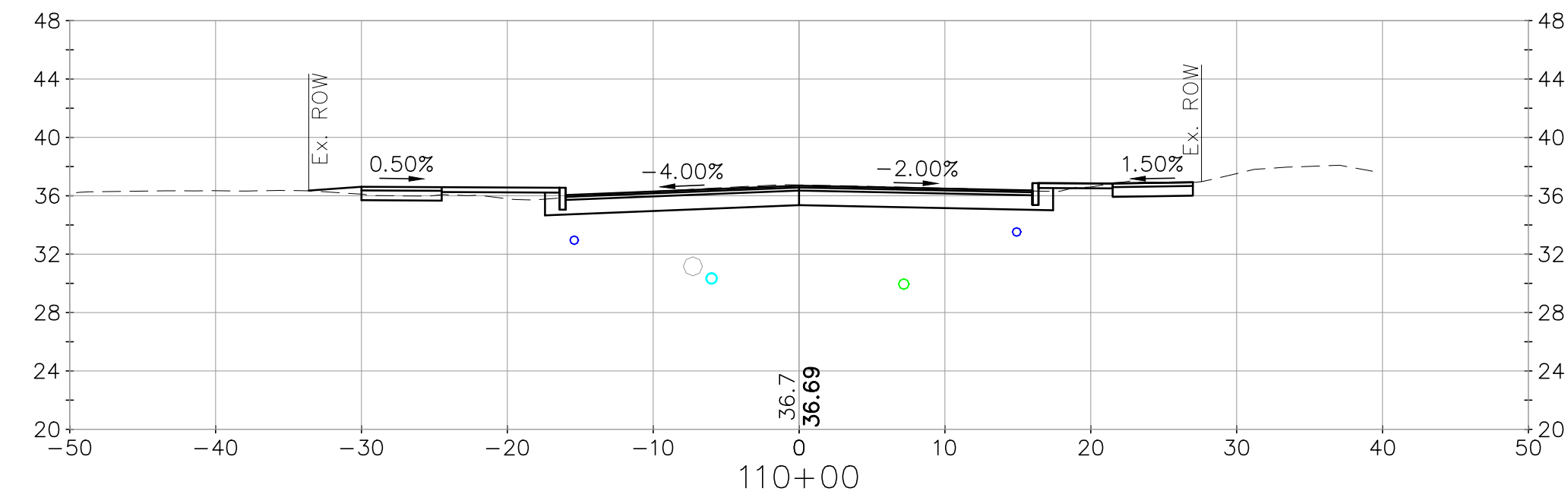
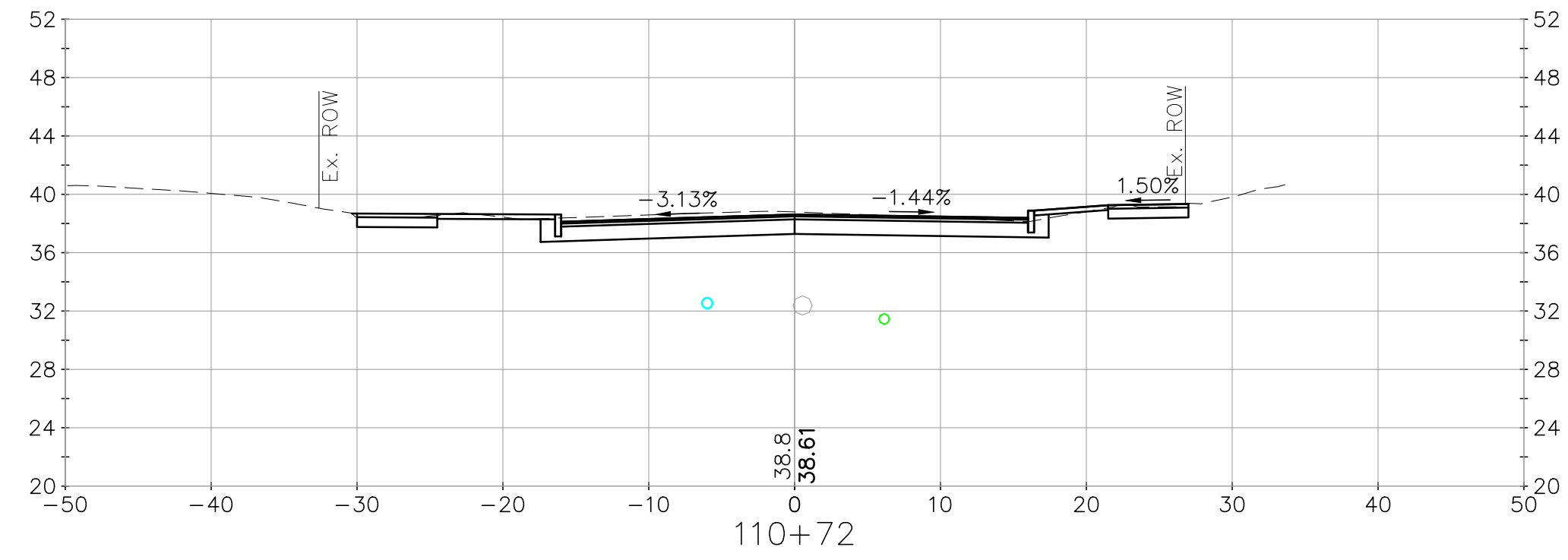
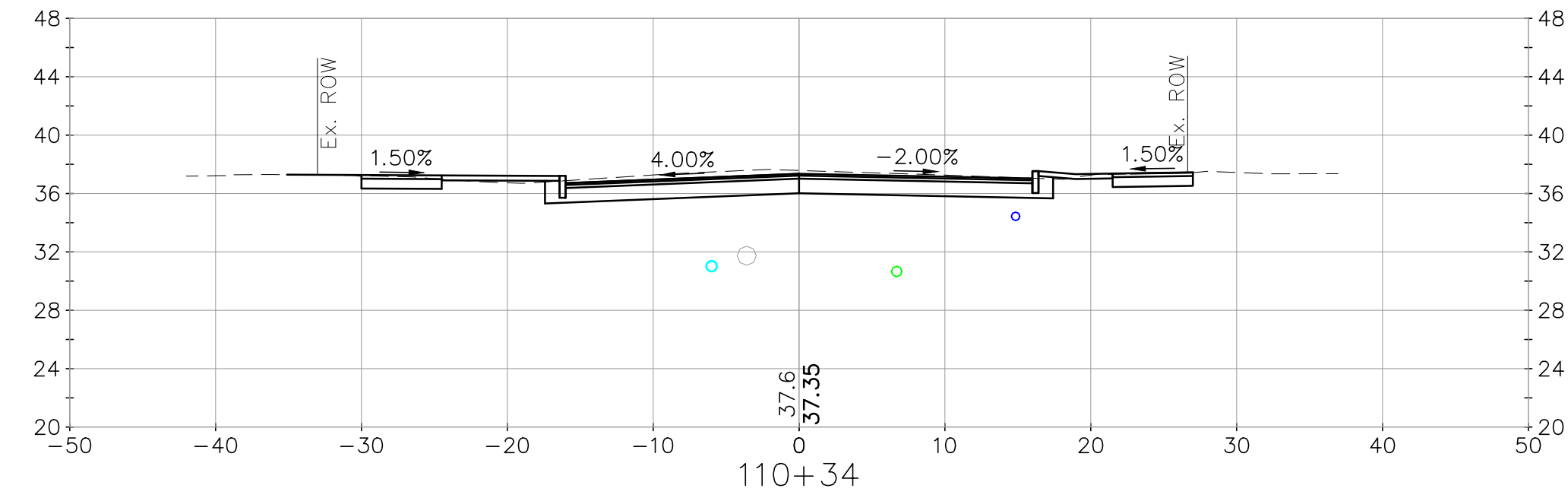






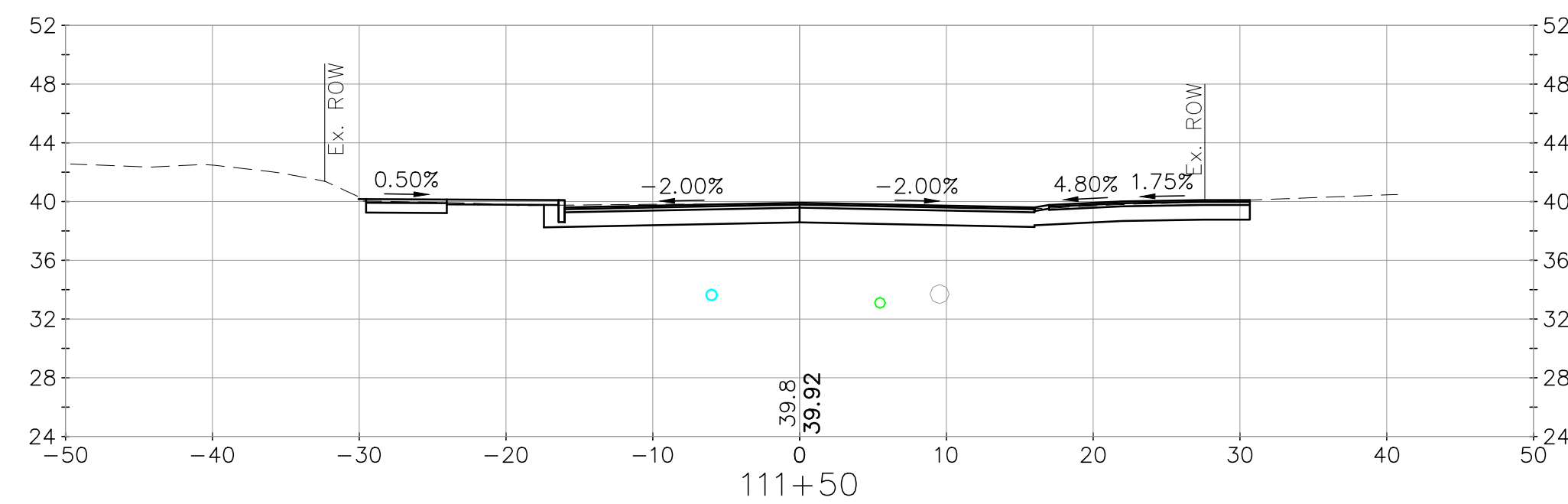
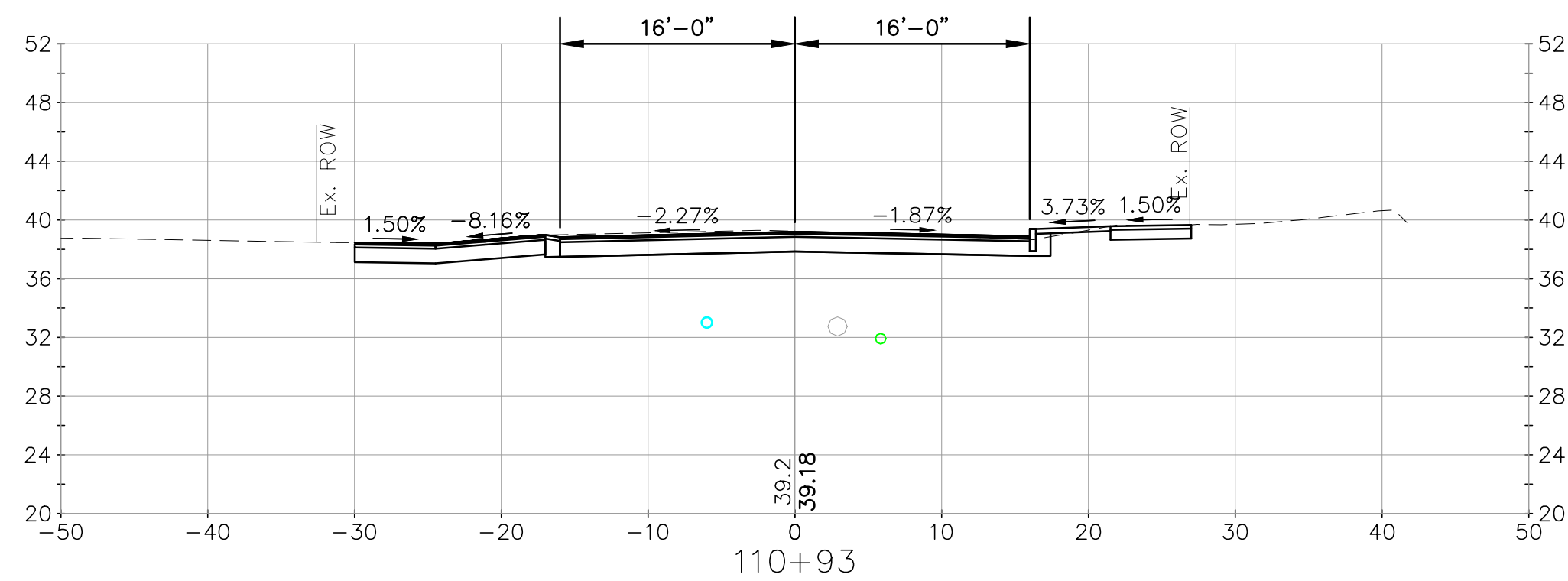
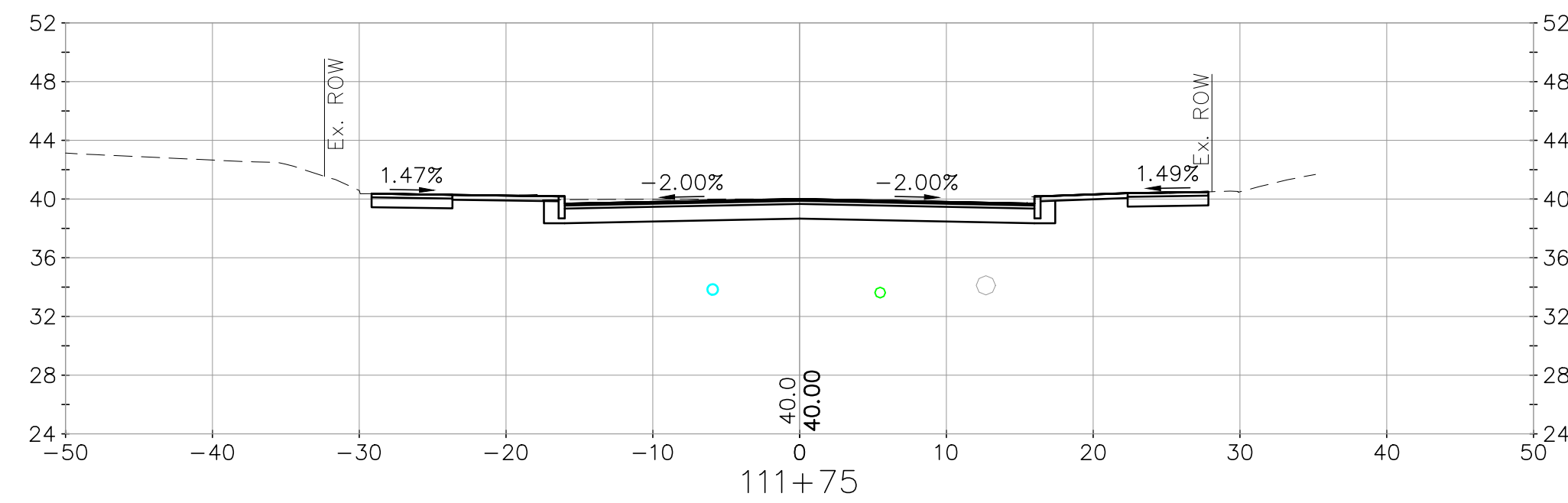
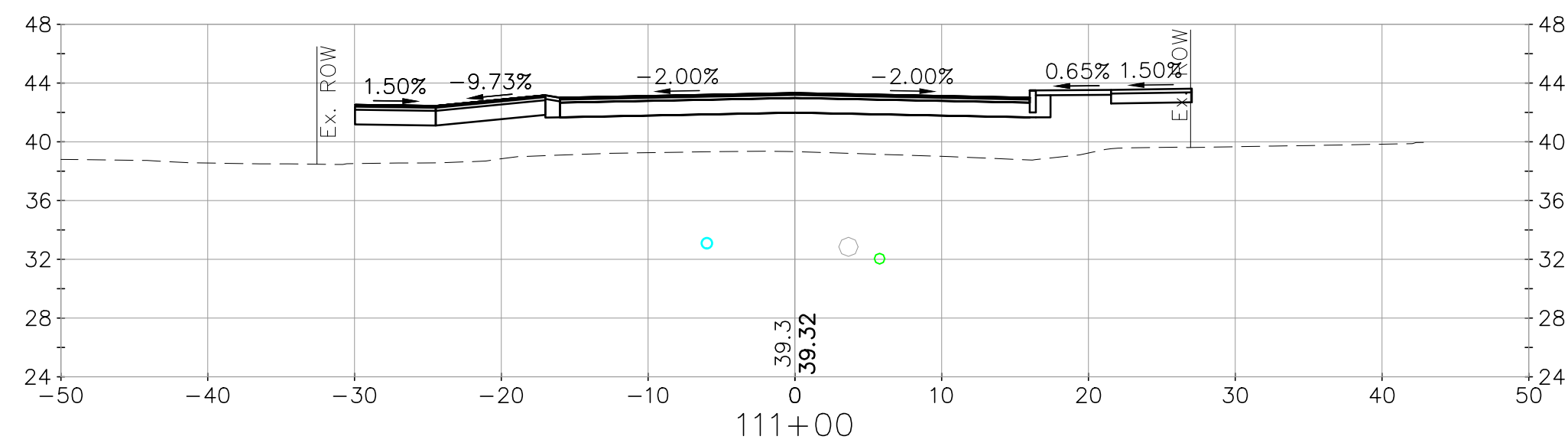
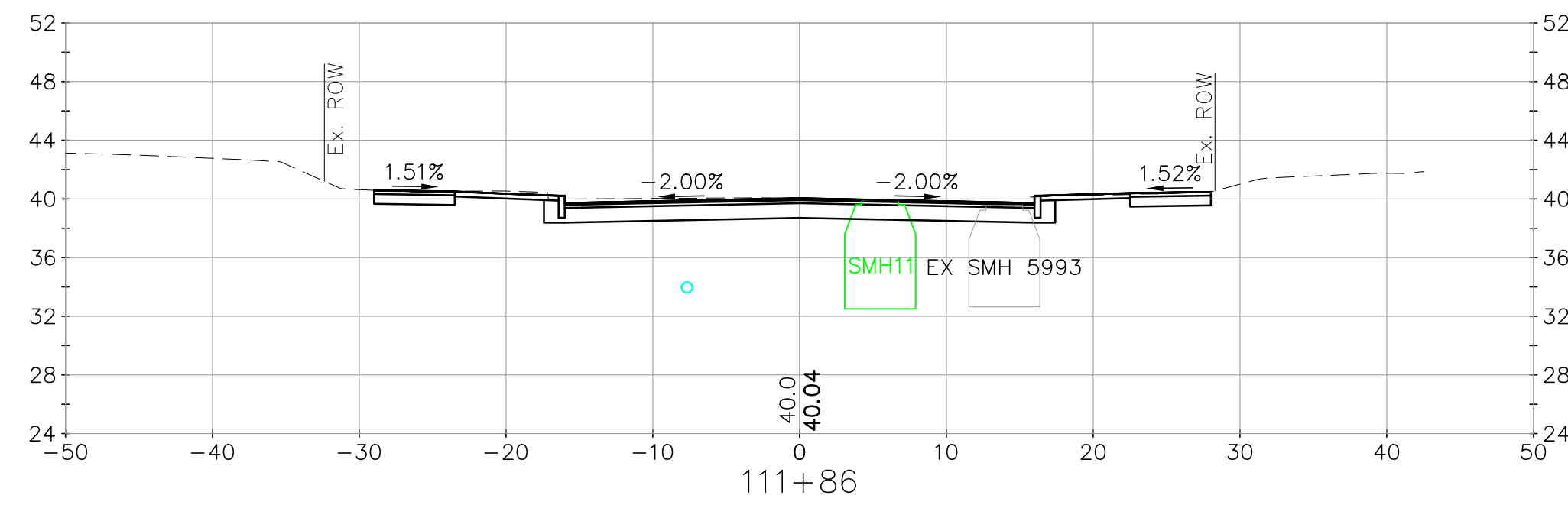
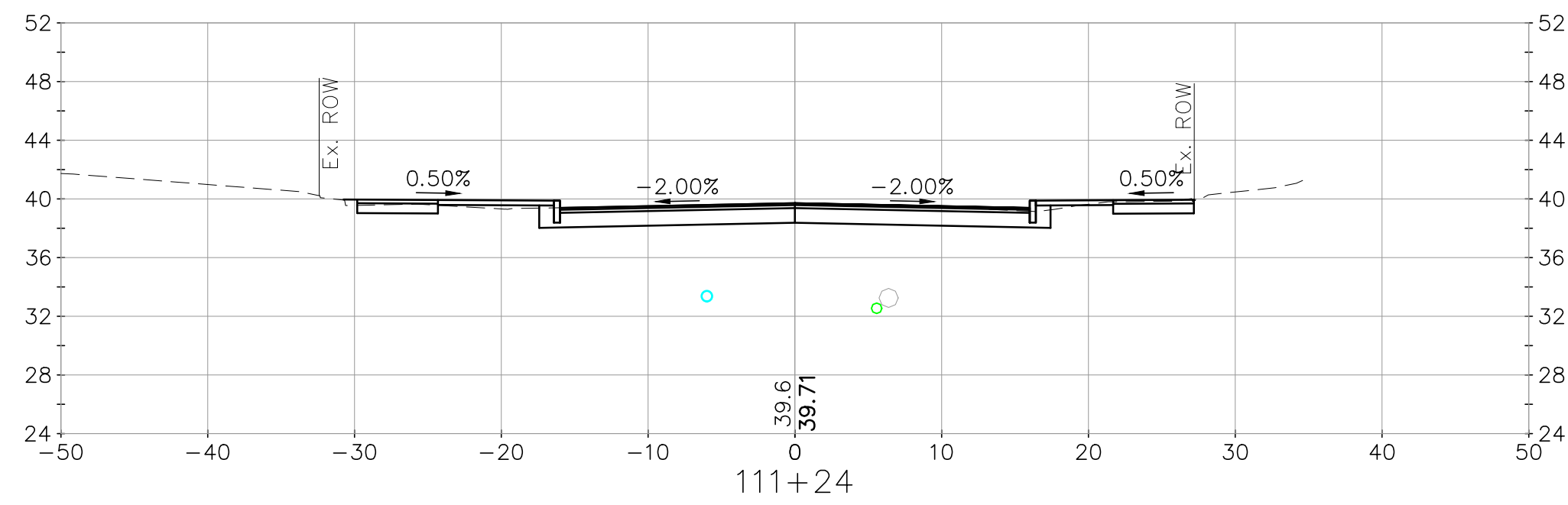
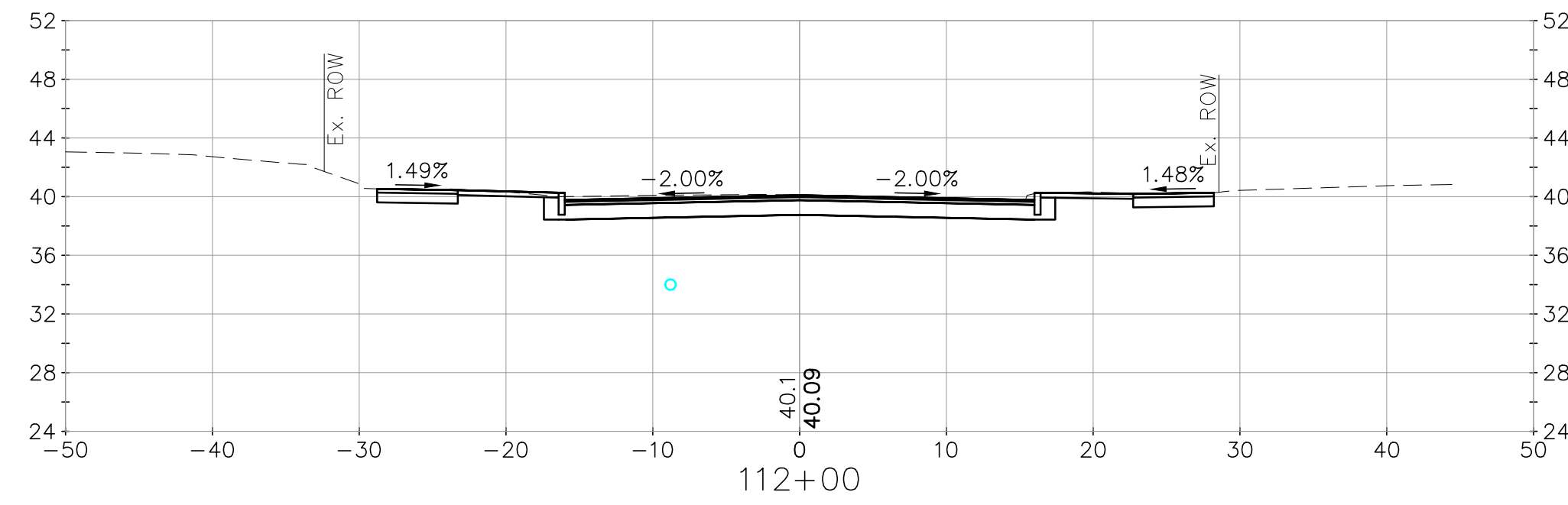
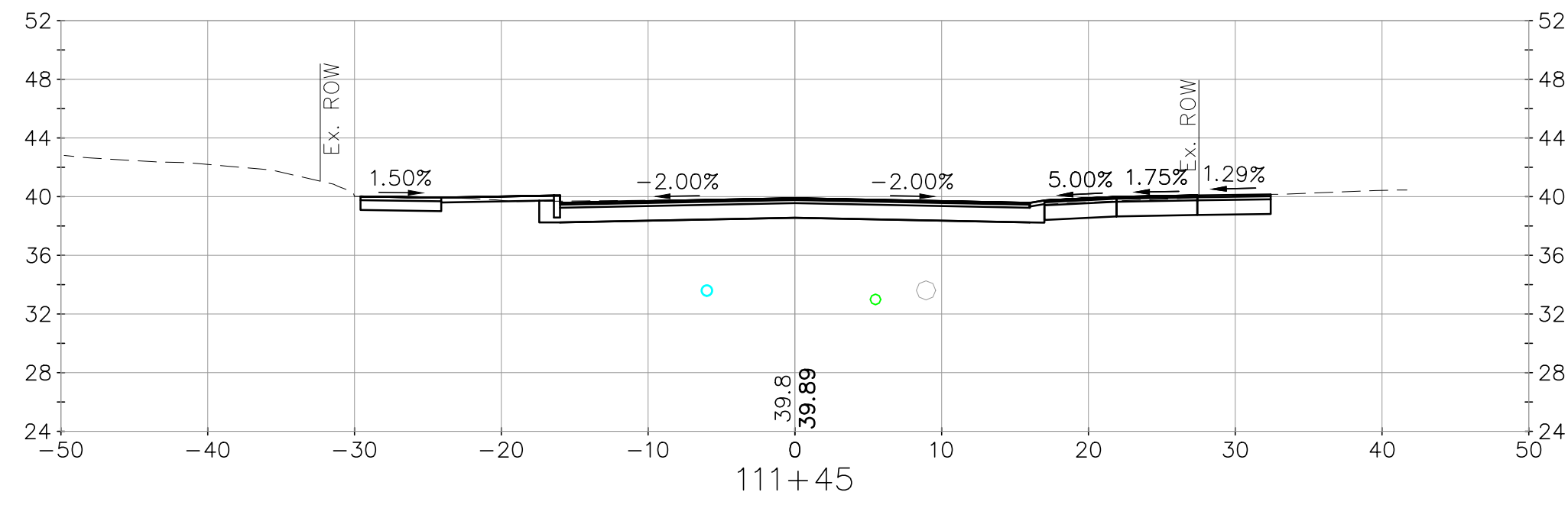
<p><b>CMA ENGINEERS</b> Civil/Environmental/Structural Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/641-4223 c m a e n g i n e e r s . c o m</p>		<p>1 Issued for Bid</p>	<p>no. revision date 2/2/2024 PAC</p>
<p>City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Cross Sections Willard Ave</p>		<p>designed by: CFC/SIF drawn by: WWG approved by: PAC checked by: PAC</p>	<p>date: February 2024 project no: 1211</p>
<p>Scale: 1" = 10' 0 10' 20'</p>		<p>drawing no. <b>XS-5</b></p>	
<p>sheet: 41 of 55</p>		<p>date: 2/2/2024</p>	



		CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH 603/431-6196 Manchester, NH 603/627-0708 Portland, ME 207/641-4223		c m a e n g i n e e r s . c o m	
		2/2/2024		no.	
date: February 2024	project no: 1211	designed by: CFC/STF	drawn by: WWG	checked by: PAC	approved by: PAC
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project		Cross Sections Willard Ave	
drawing no. <b>XS-6</b>					
sheet: 42 of 55					
				Issued for Bid	2/2/2024
				revision	date
				1	by



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 2/2/2024		designed by: CFC/SIF drawn by: WWG approved by: PAC checked by: PAC date: February 2024 project no: 1211 scale: 1" = 10' 0 10' 20'
City of Portsmouth, New Hampshire Department of Public Works Willard Ave Area Improvement Project Cross Sections Willard Ave		drawing no: <b>XS-7</b> sheet: 43 of 55



no.	1	Issued for Bid
revision		
date	2/2/2024	
by	PAC	

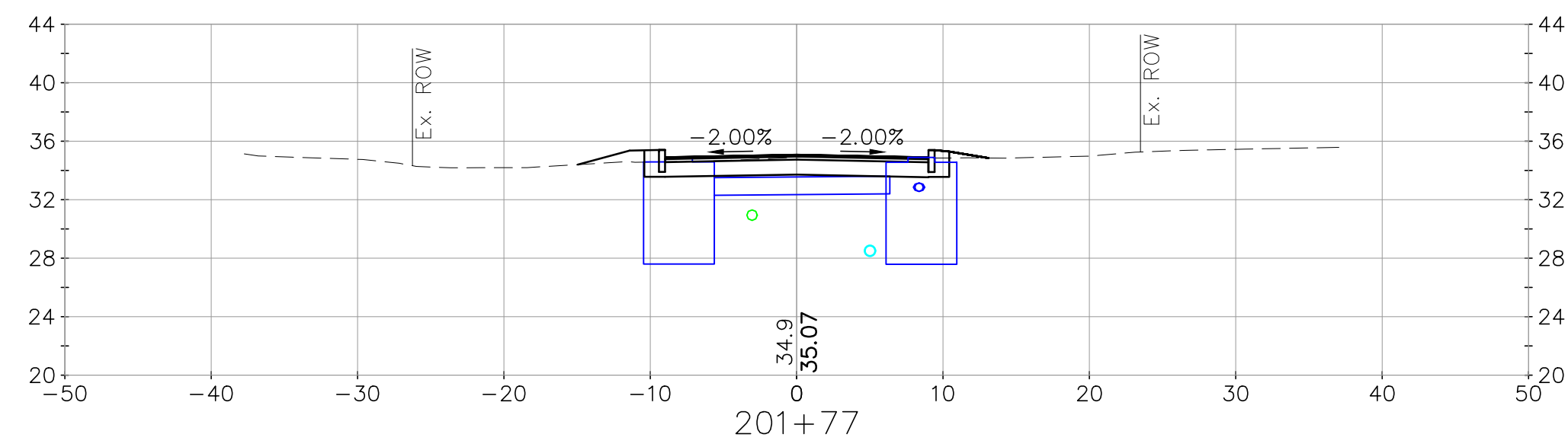
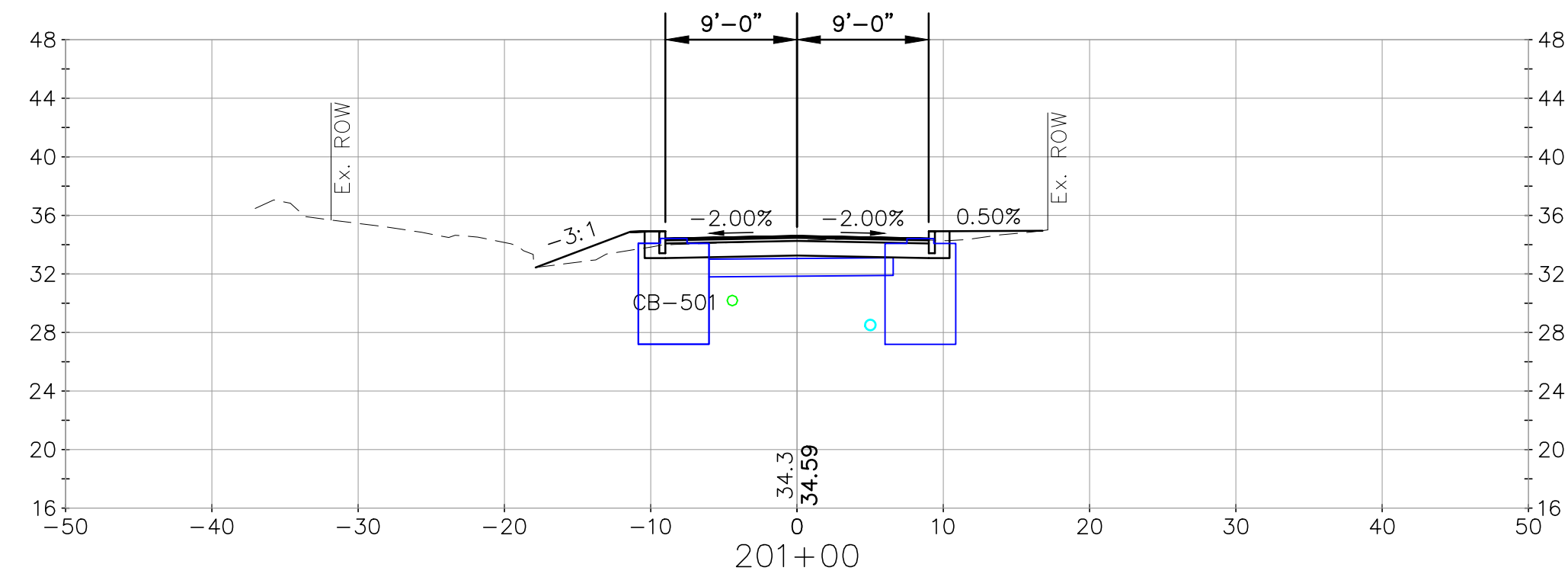
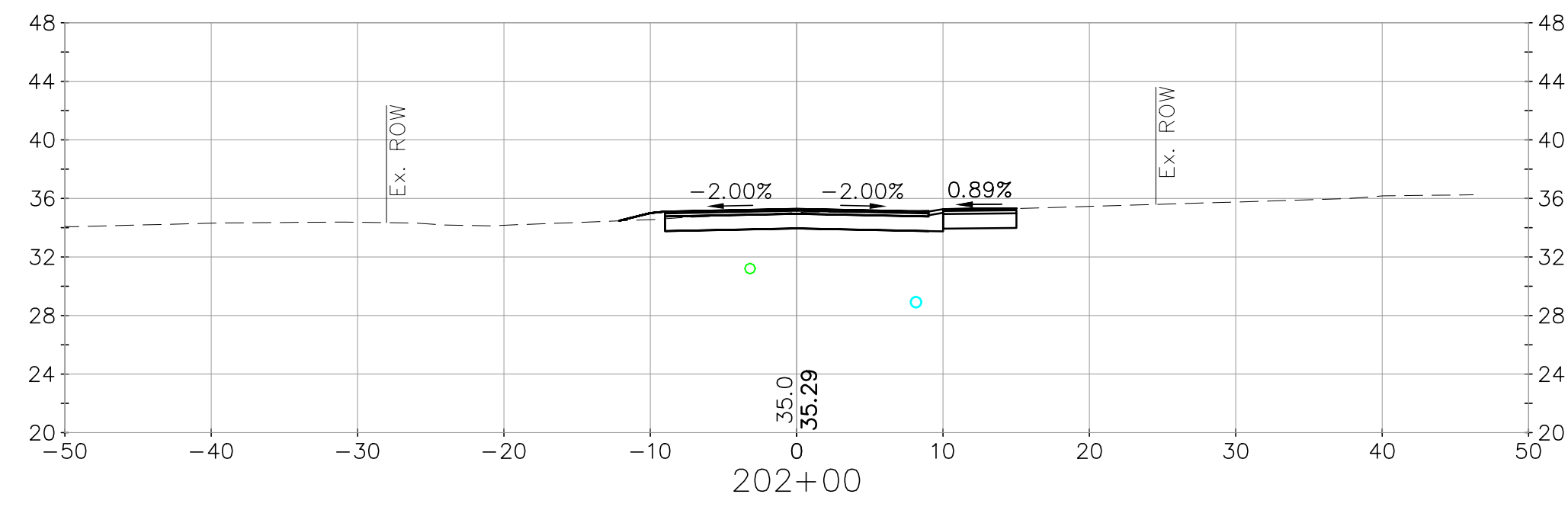
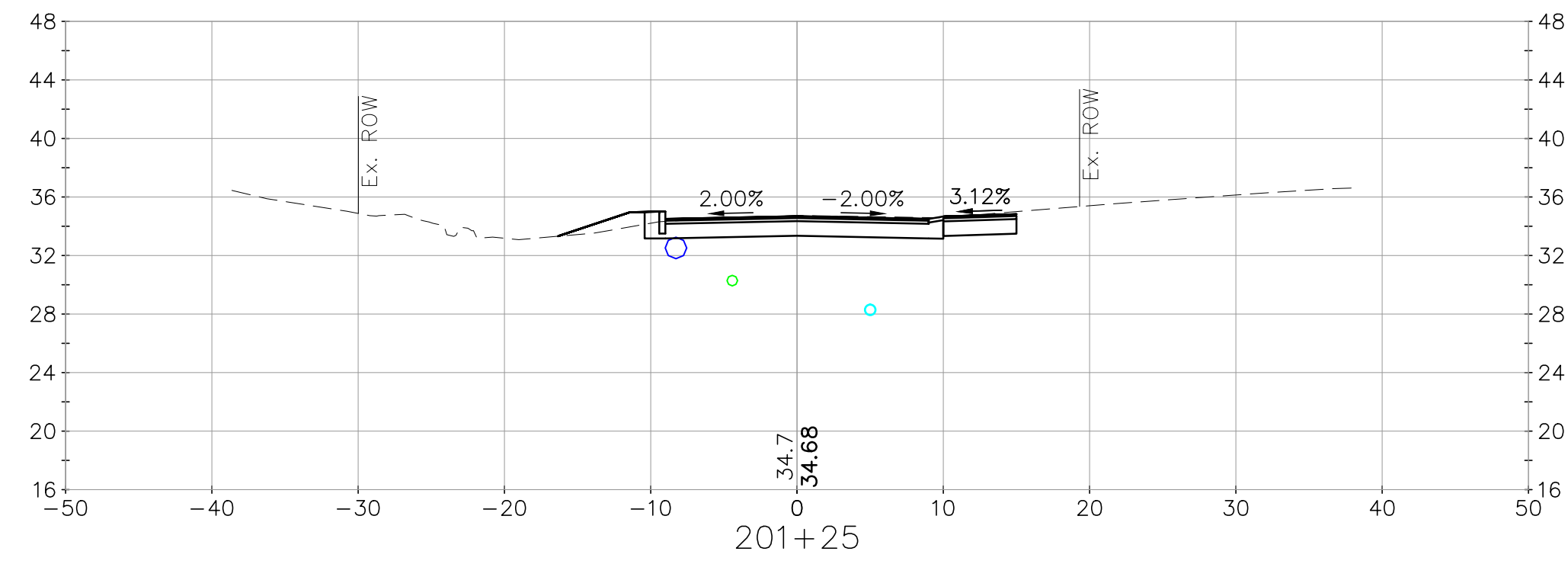
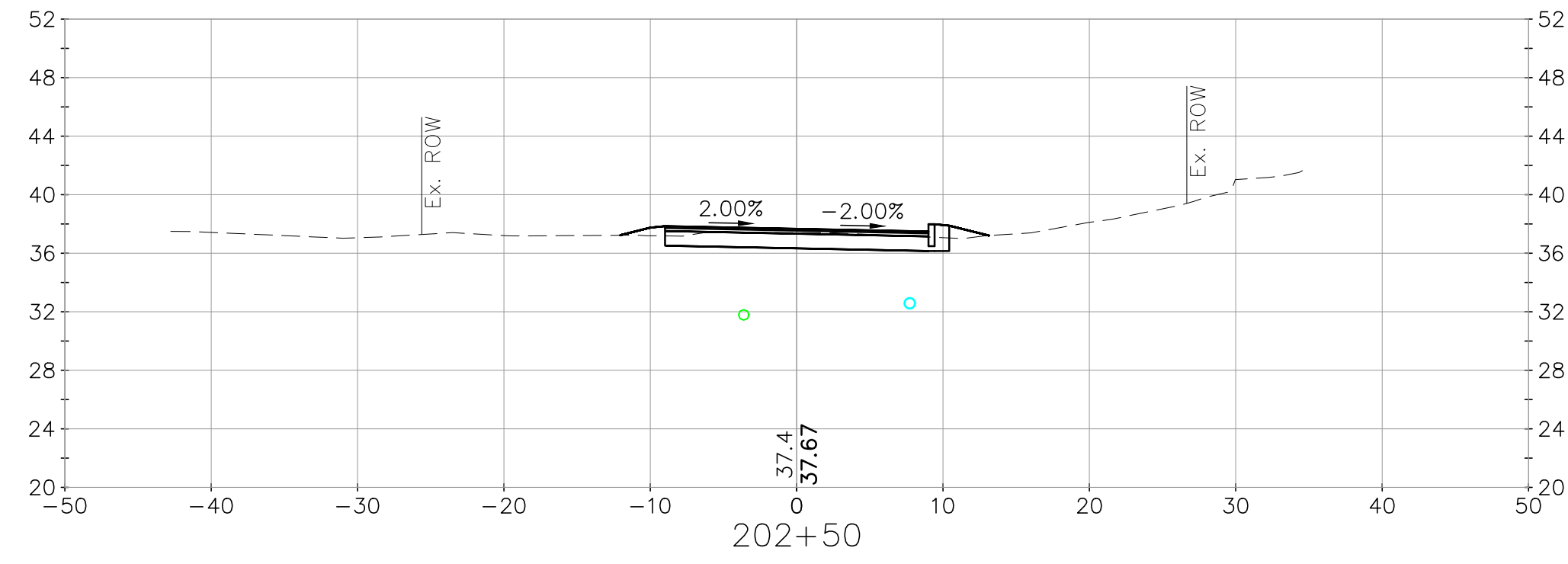
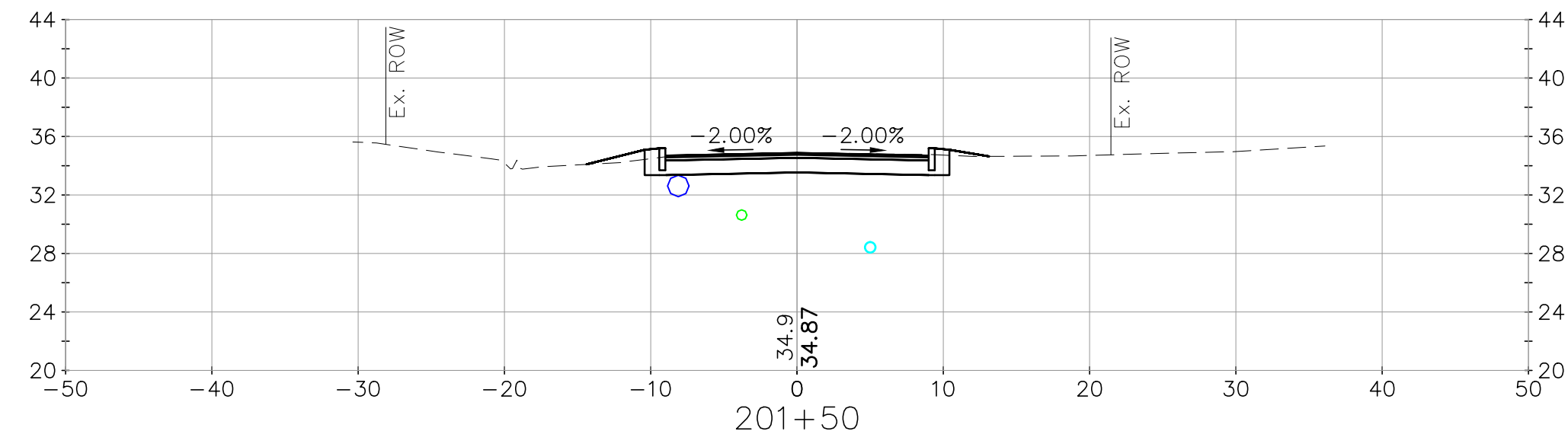
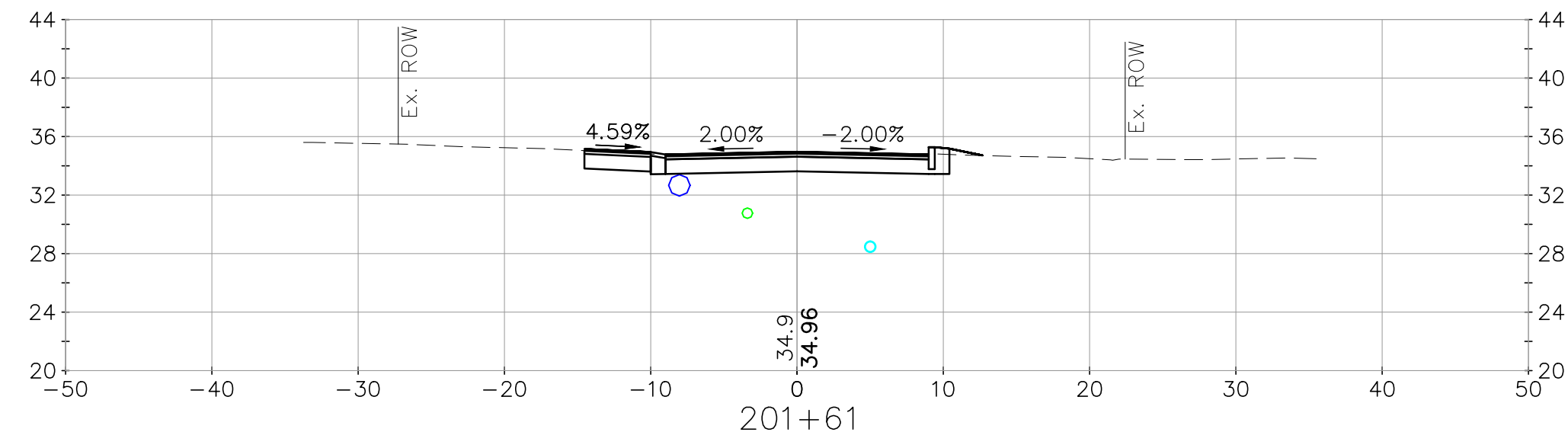
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date:	February 2024
project no.:	1211
designed by:	CFC/SIF
drawn by:	WVG
checked by:	PAC
approved by:	PAC
scale:	1" = 10'

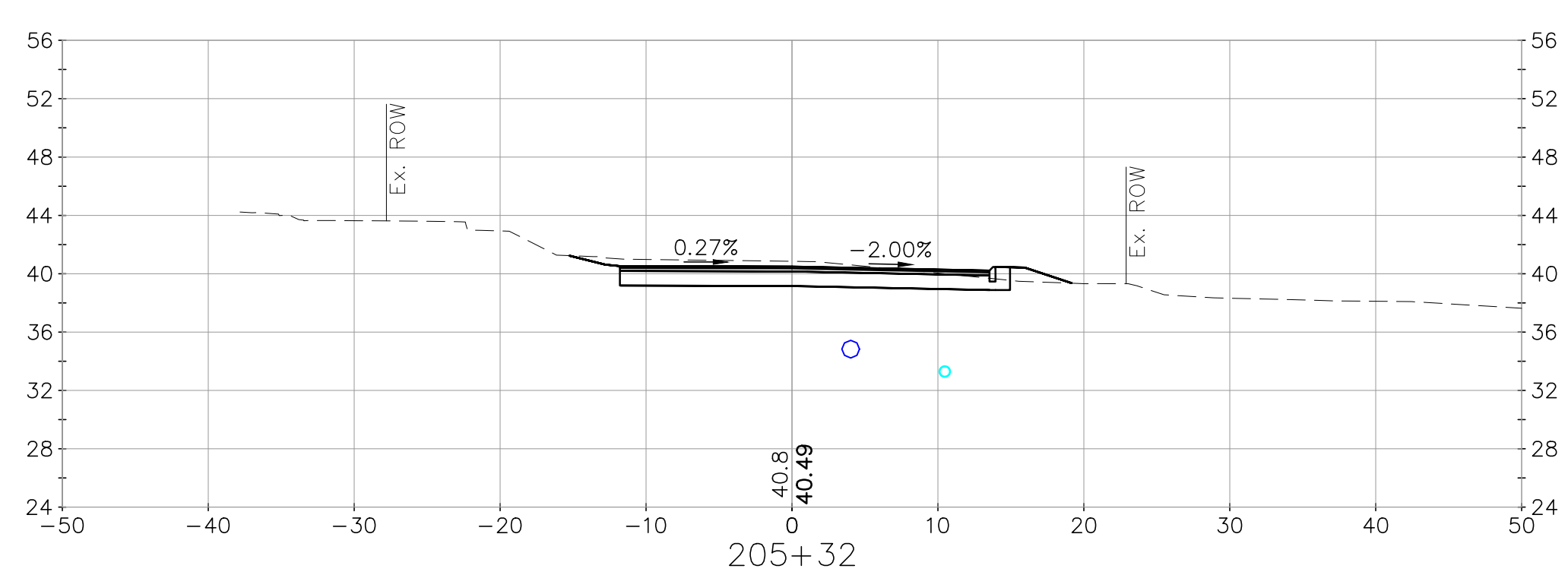
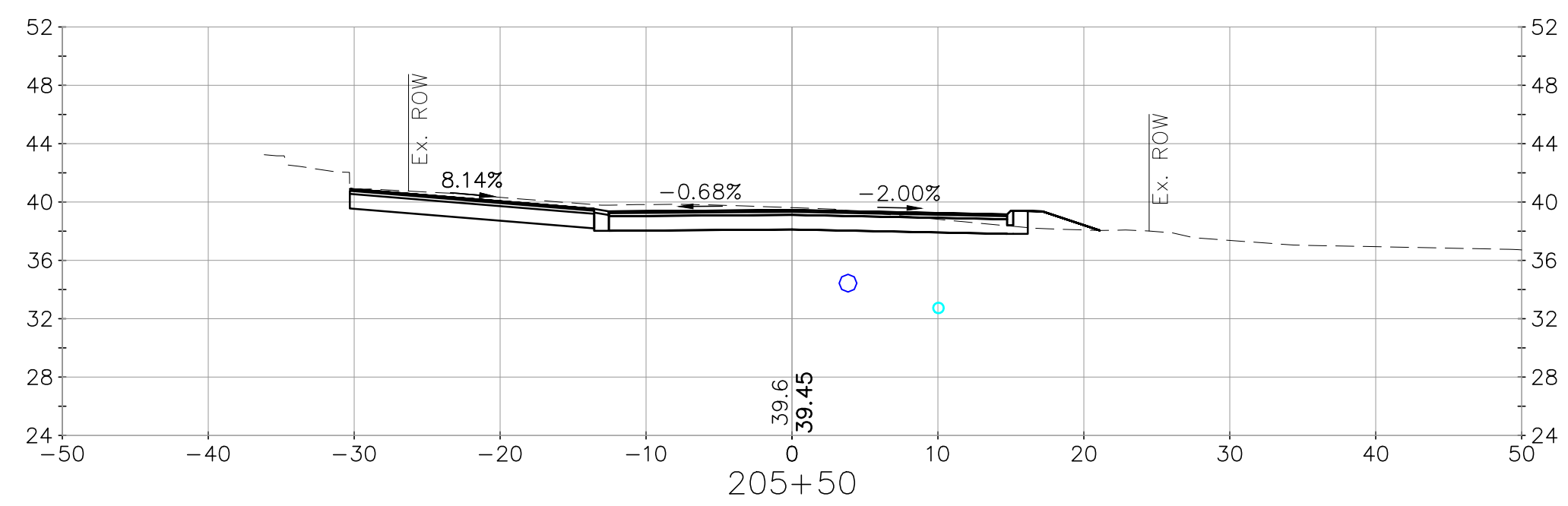
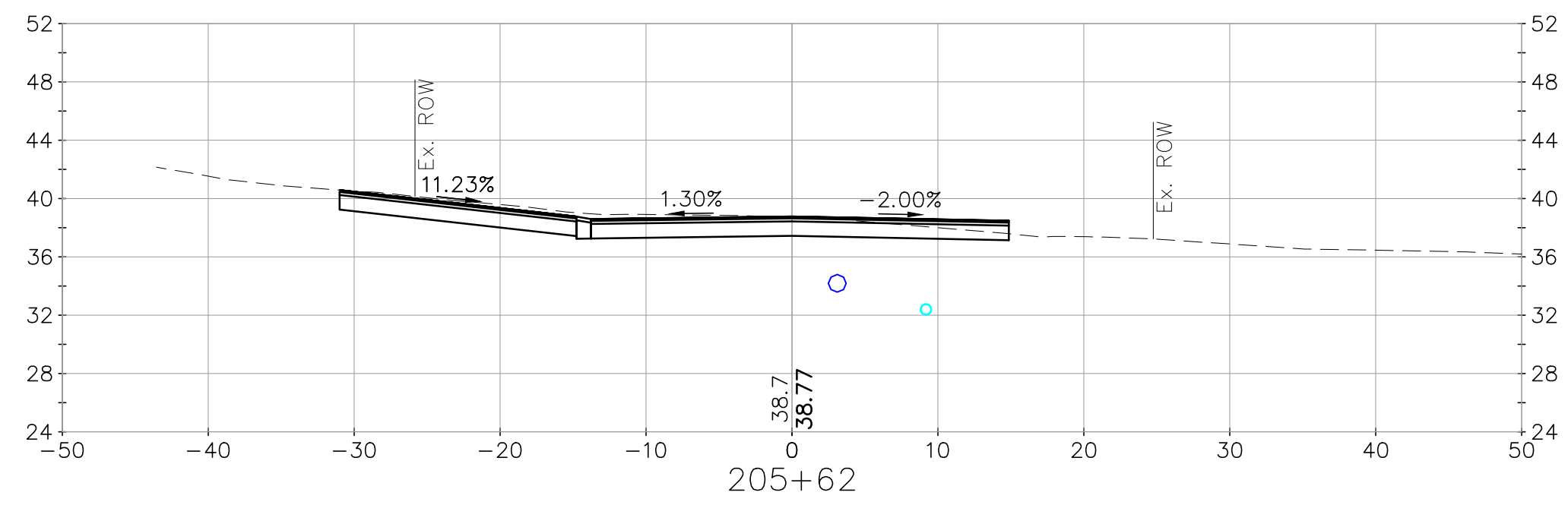
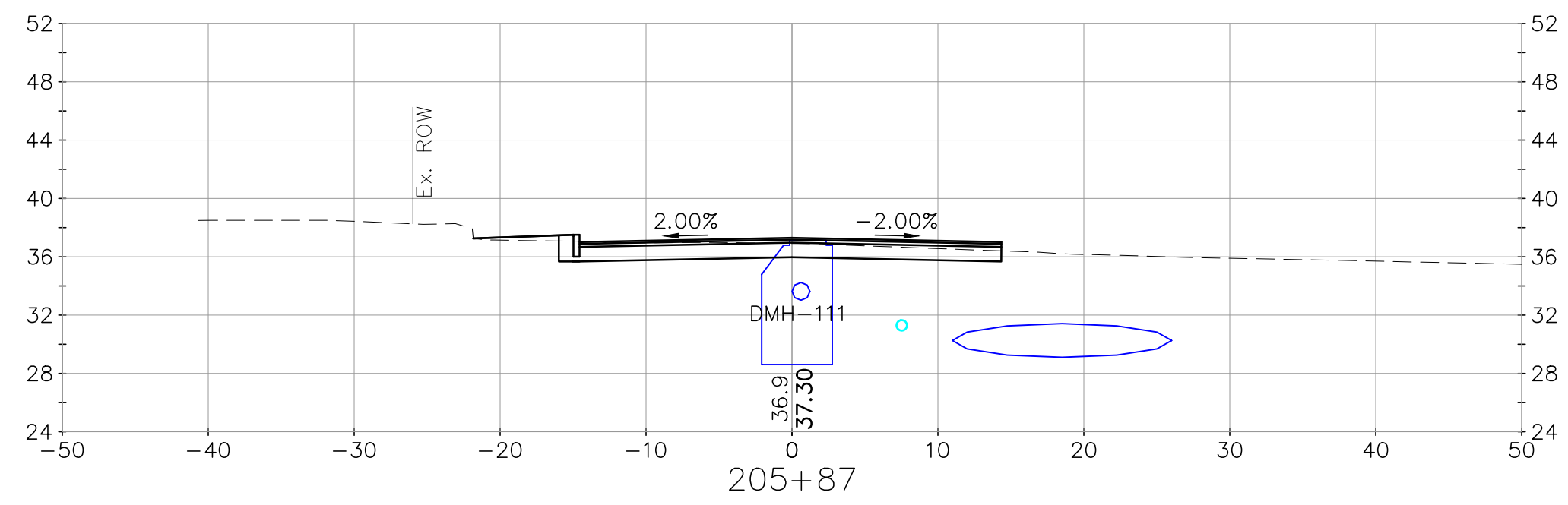
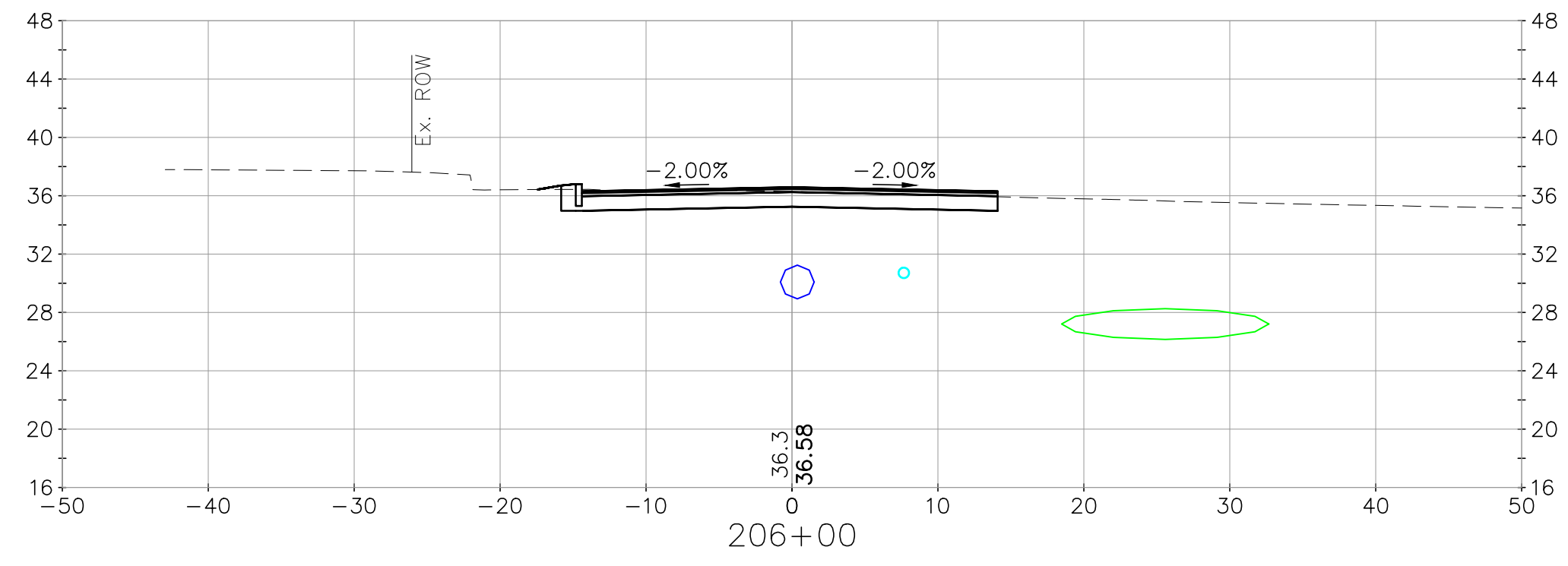
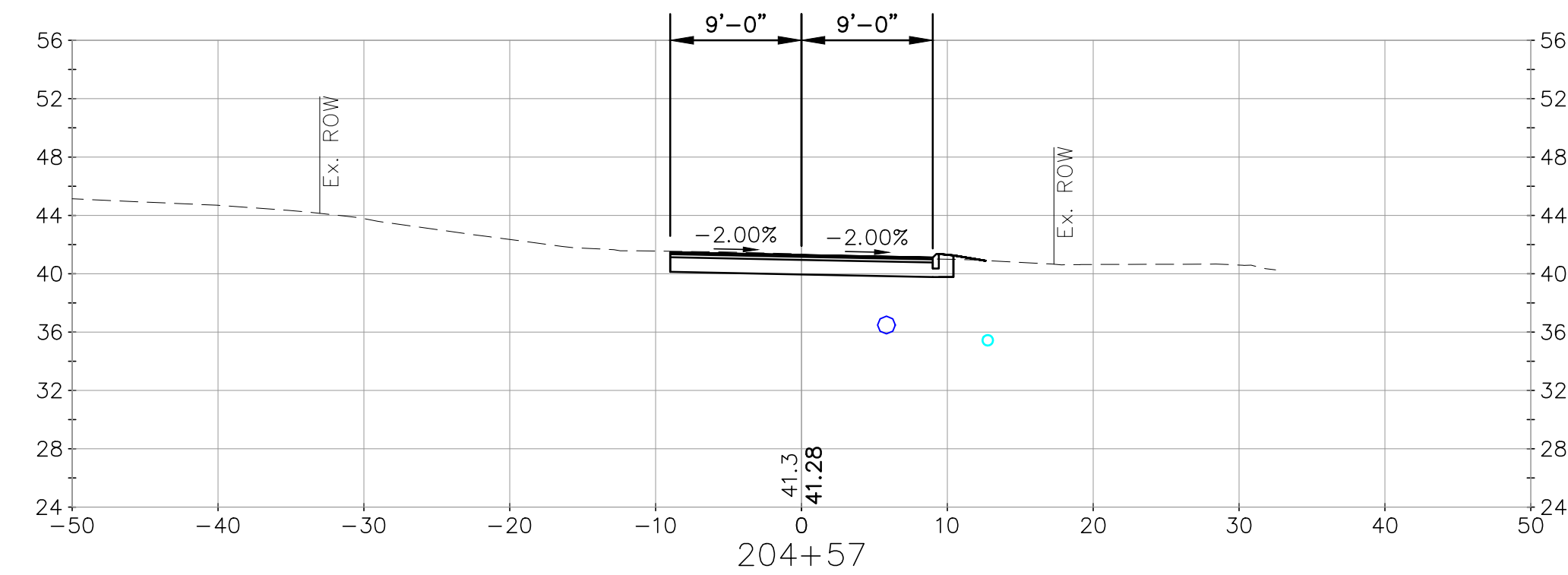
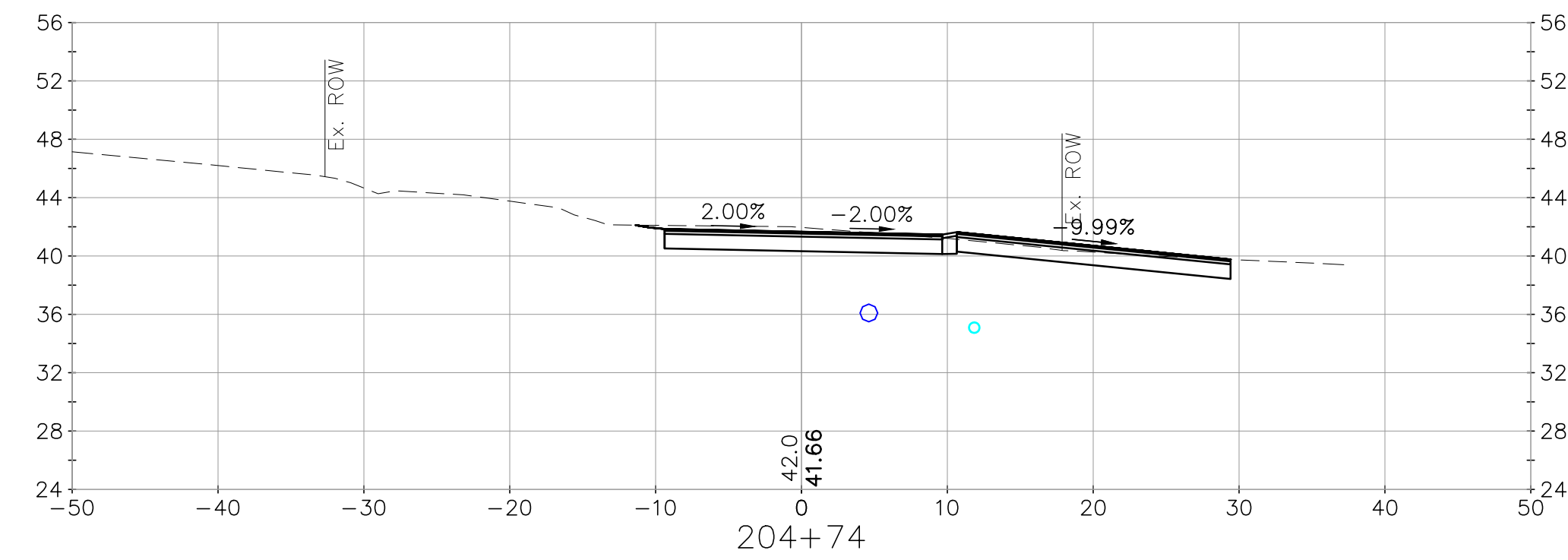
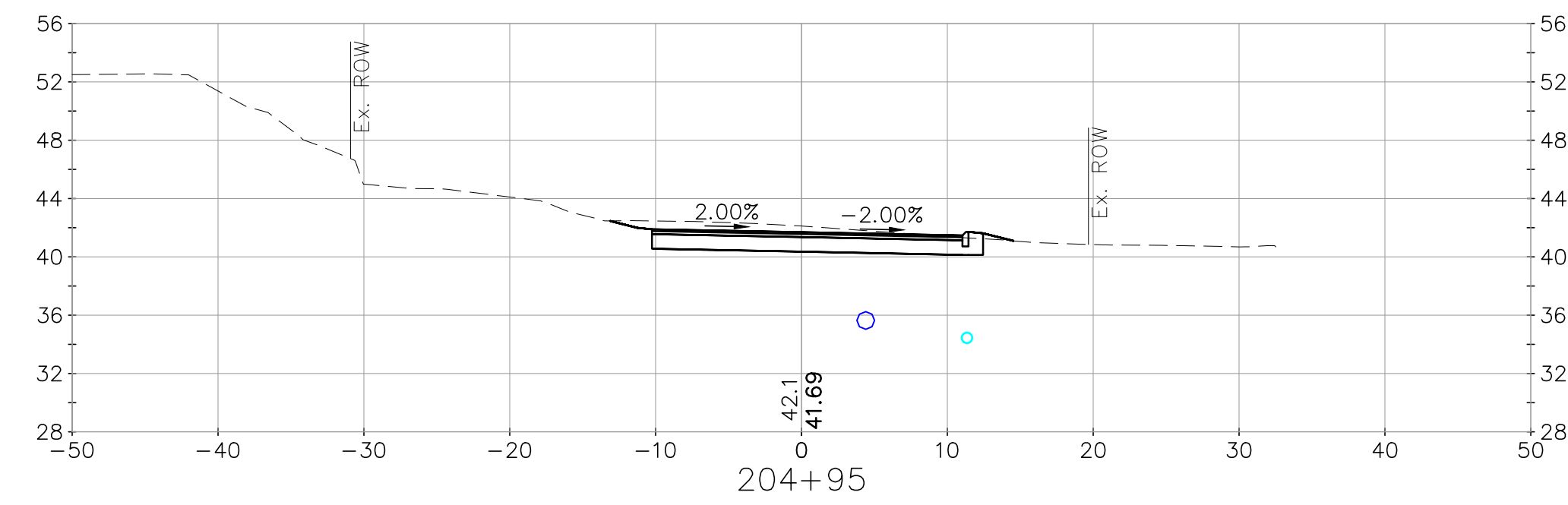
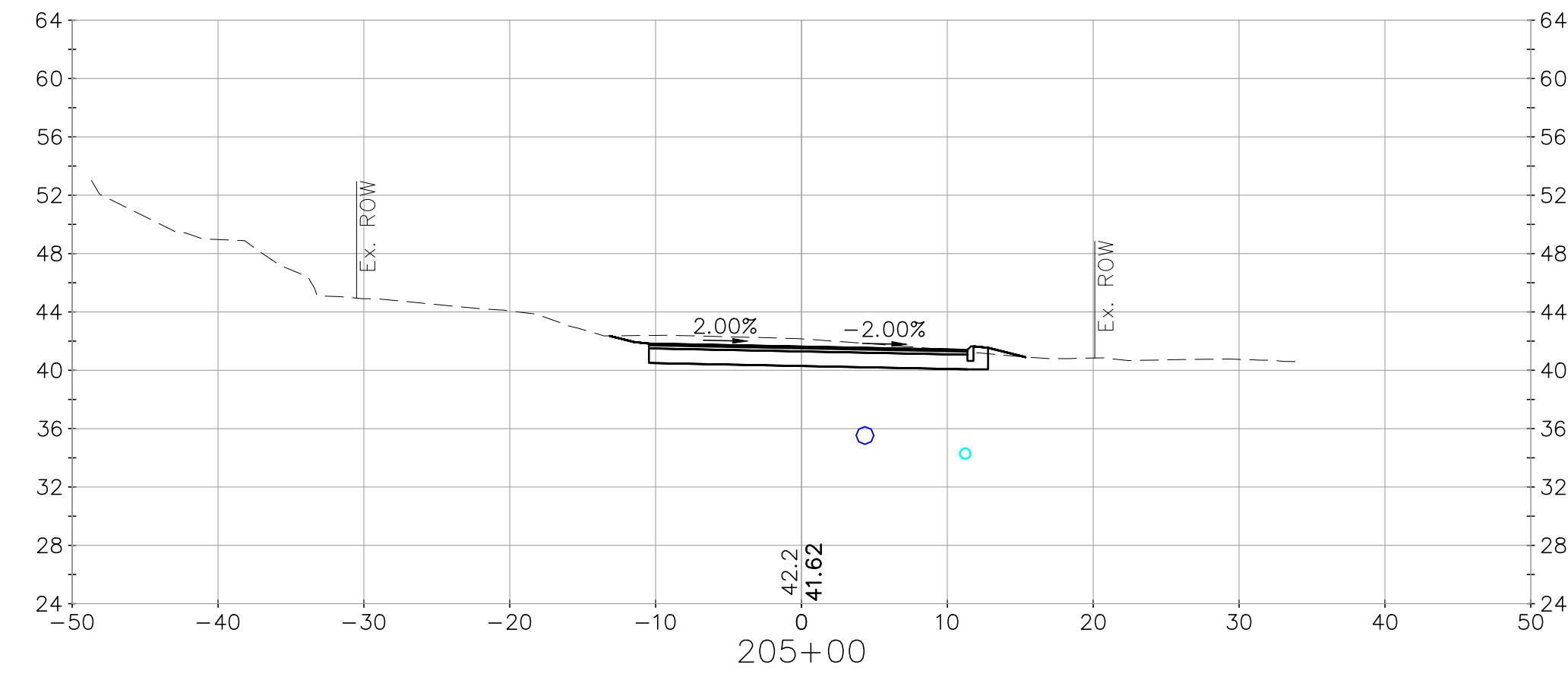
City of Portsmouth, New Hampshire  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Cross Sections  
 Willard Ave

drawing no.  
**XS-8**  
 sheet: 44 of 55



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date:	February 2024	project no:	1211	checked by:	PAC	designed by:	CFC/SJF
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<b>City of Portsmouth, New Hampshire</b> Department of Public Works				Willard Ave Area Improvement Project Cross Sections Orchard Street			
drawing no.							
<b>XS-9</b>							
sheet: 45 of 55							
							revision
							no.
							date
							2/2/2024
							by
							PAC

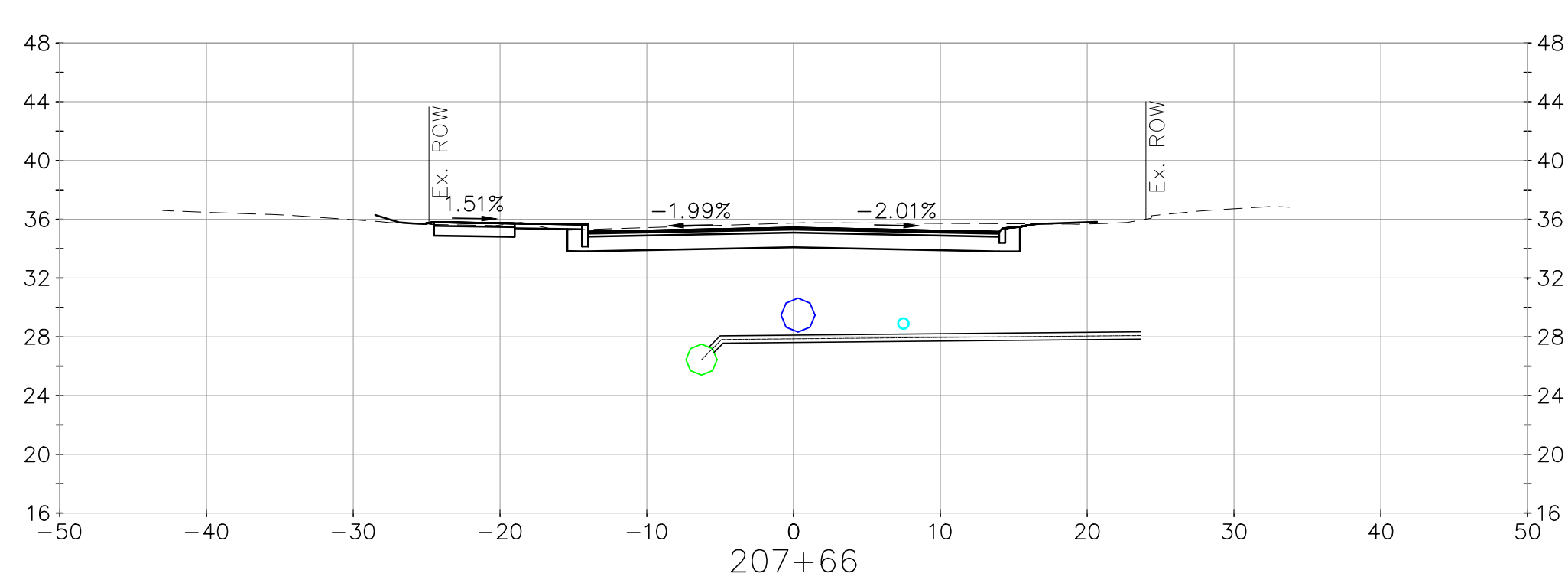
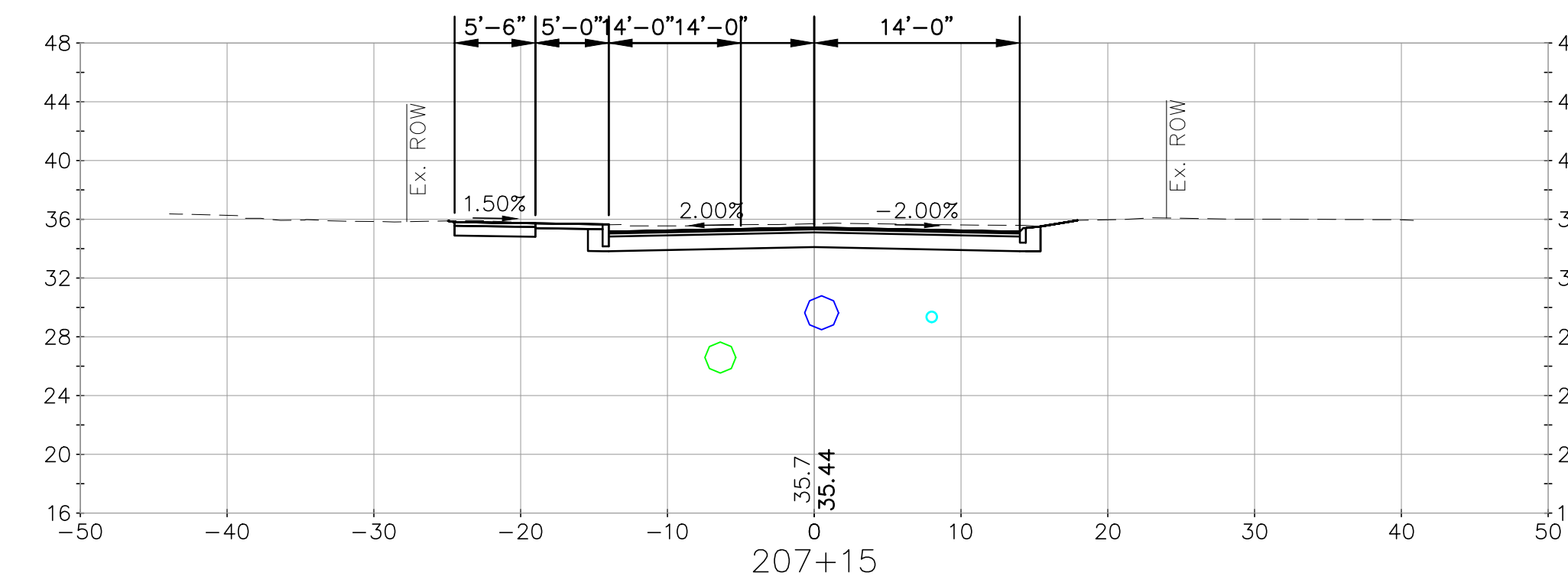
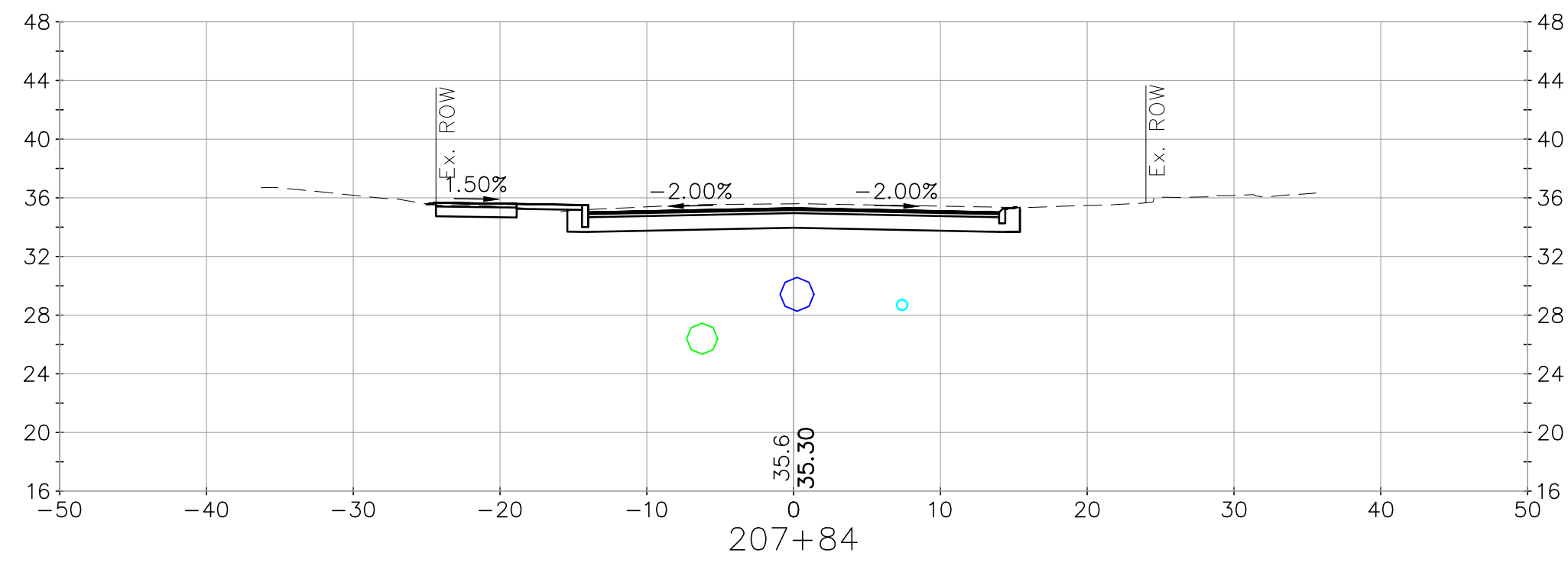
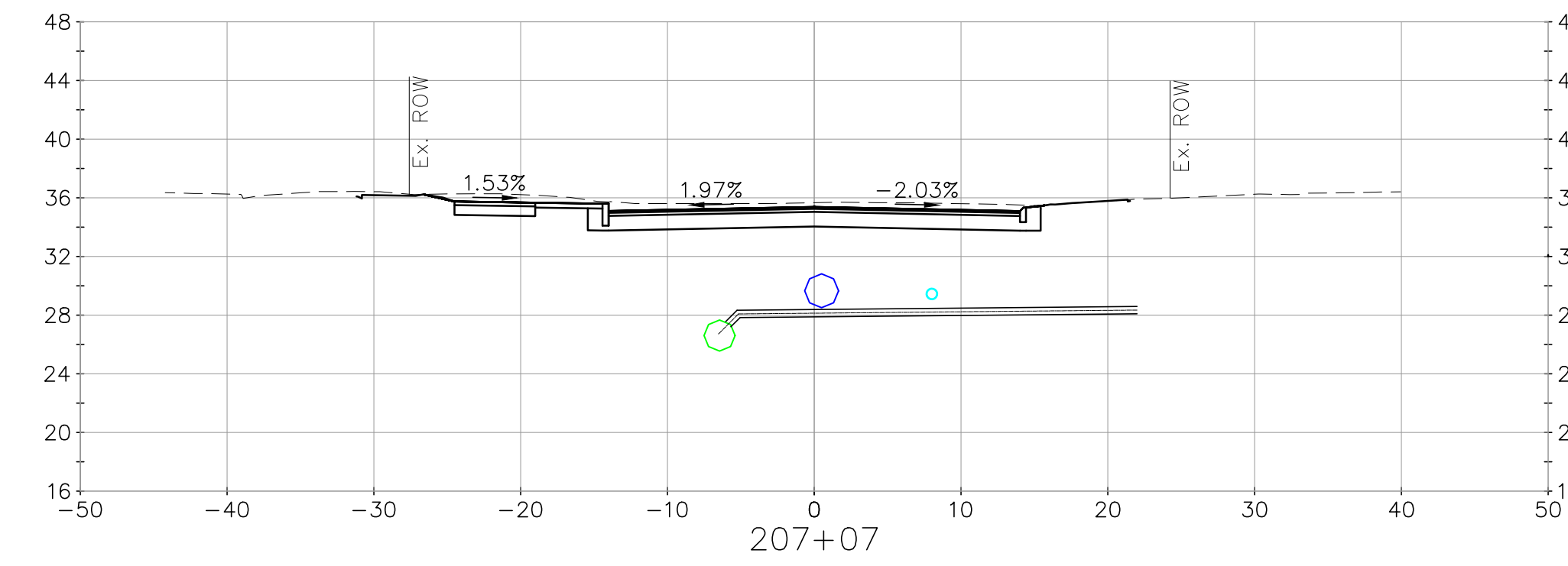
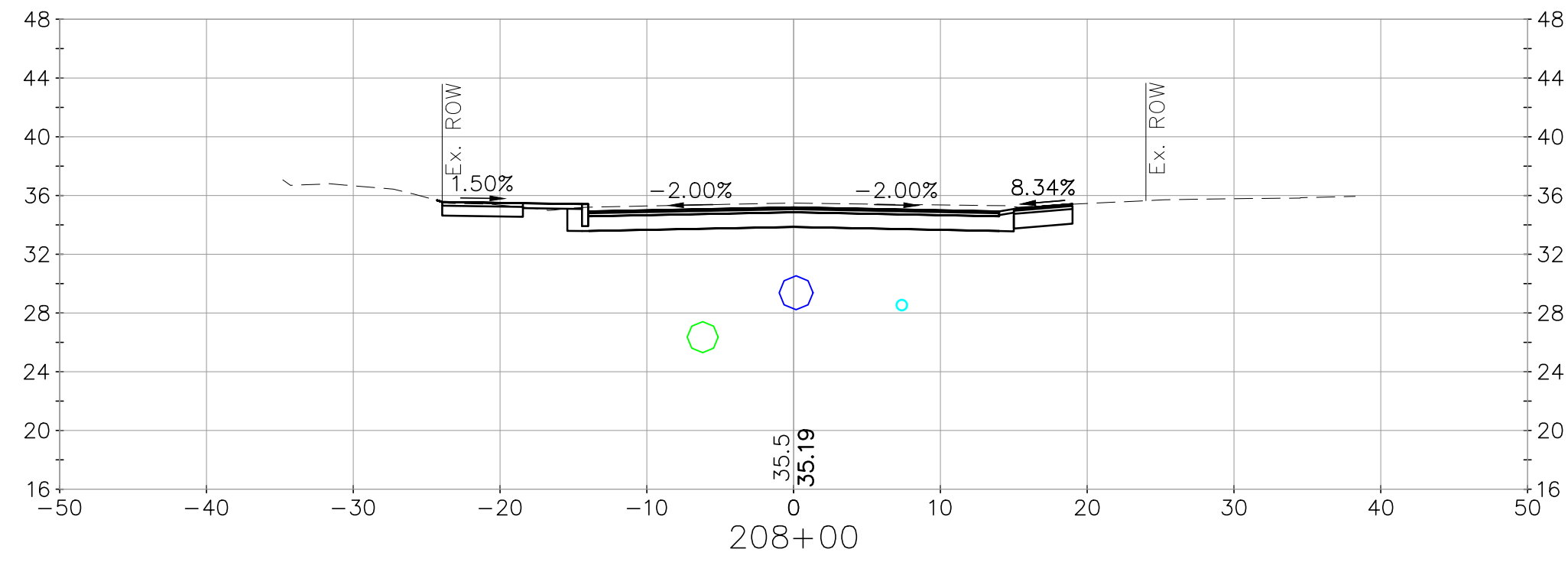
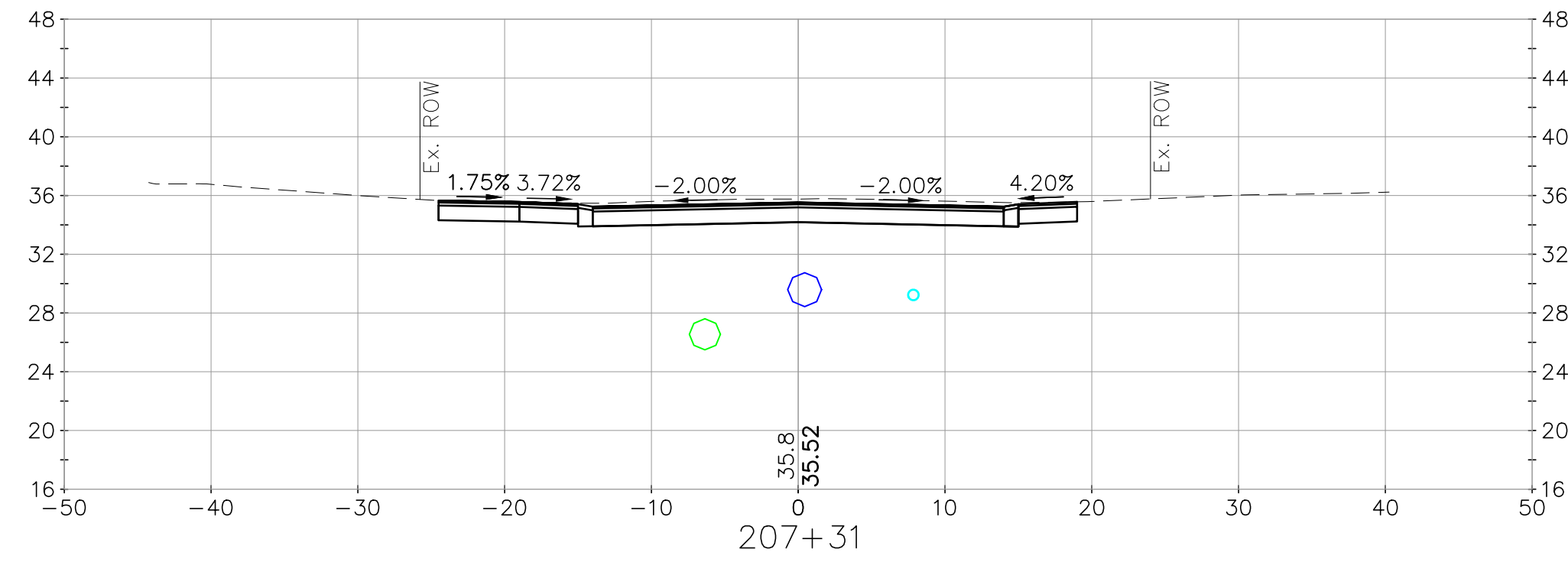
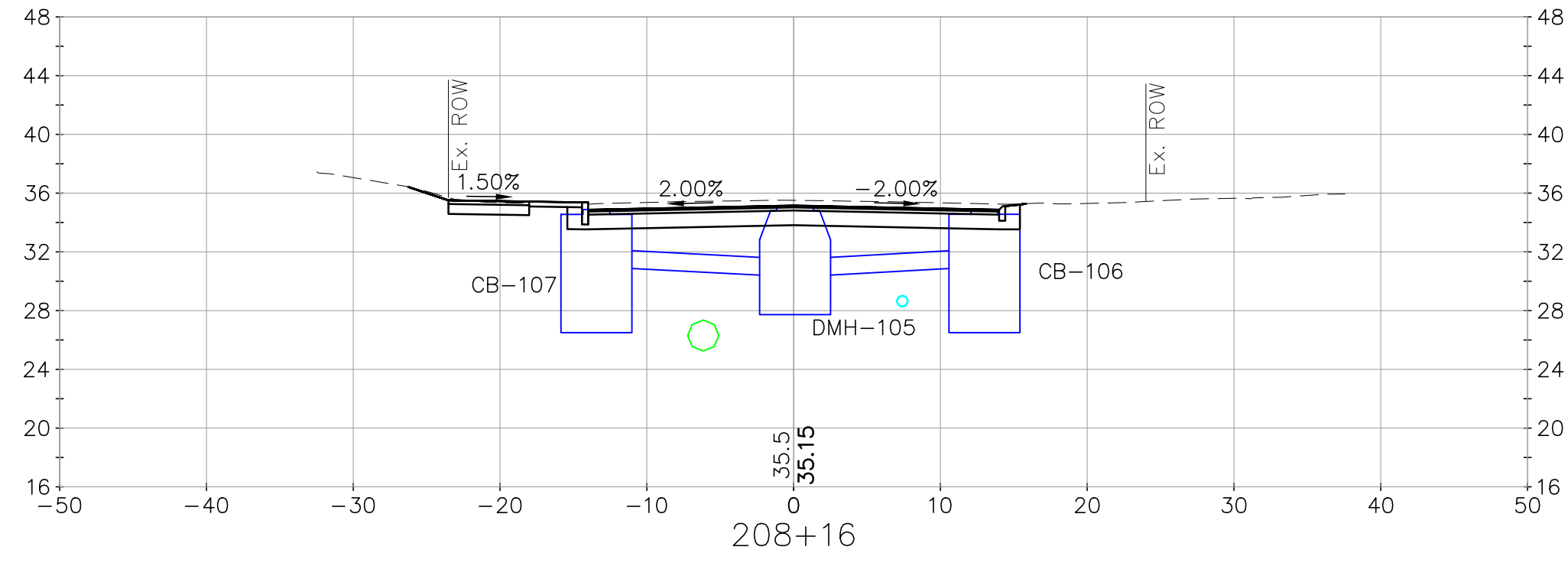
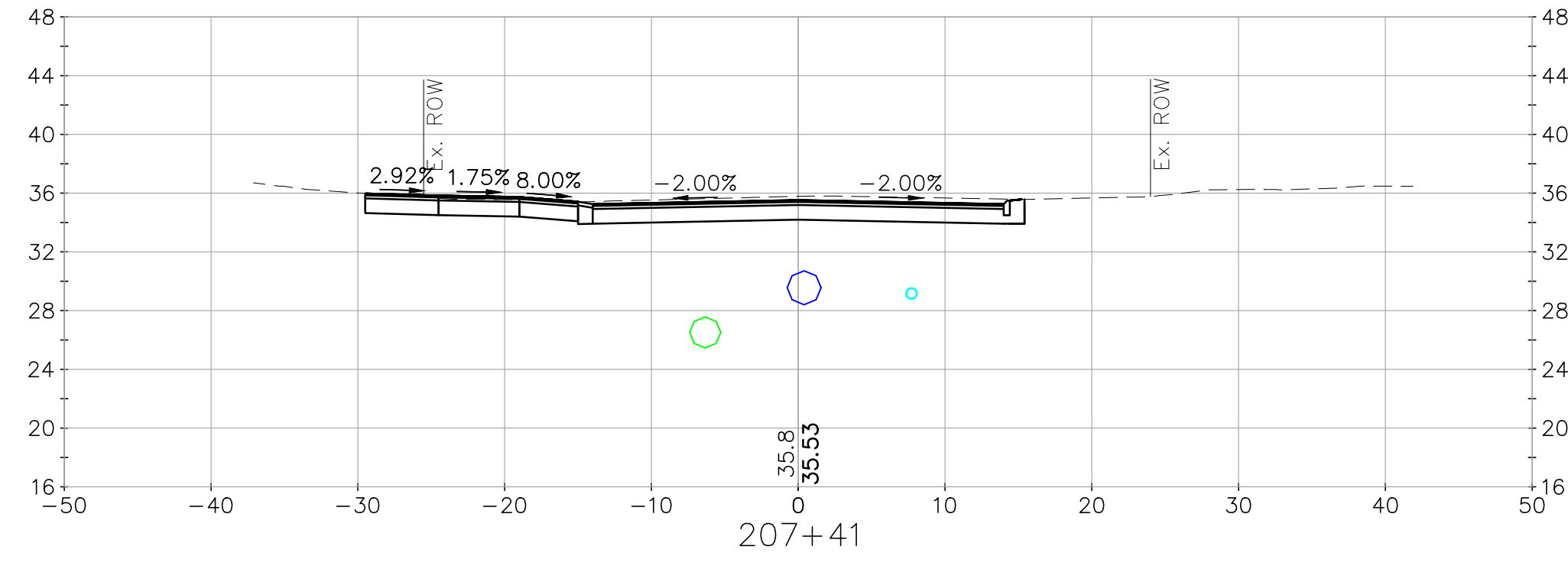
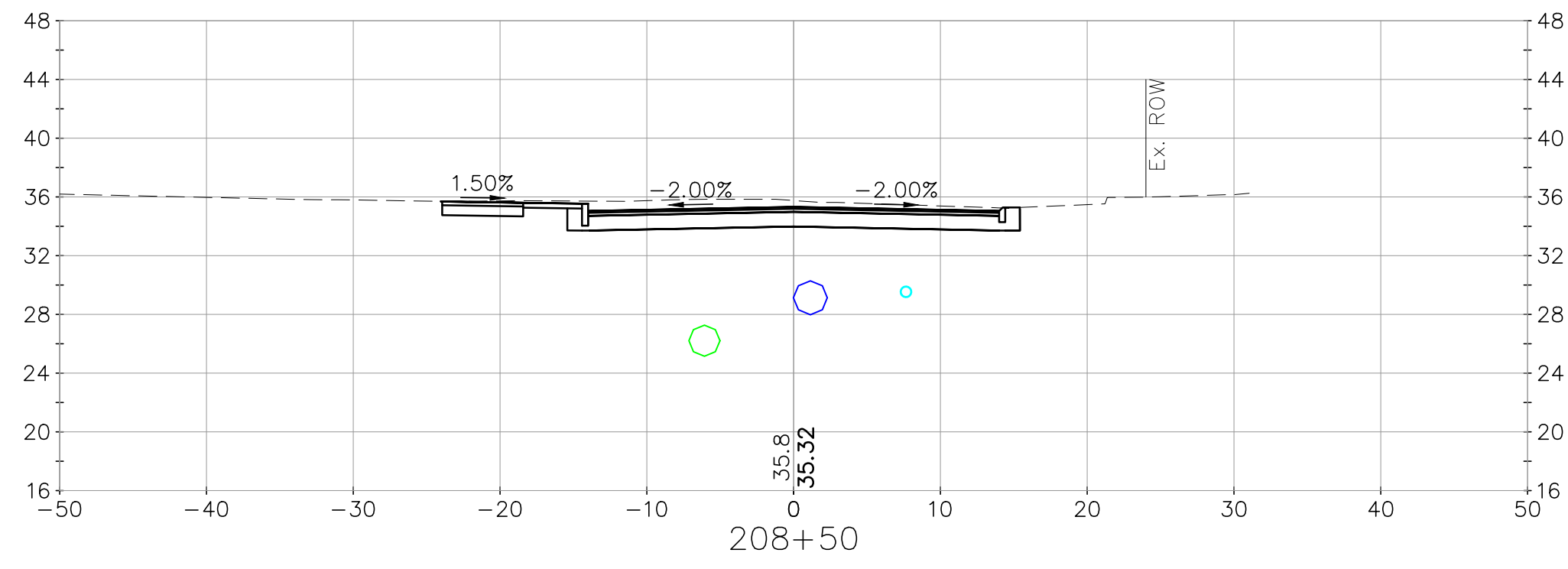
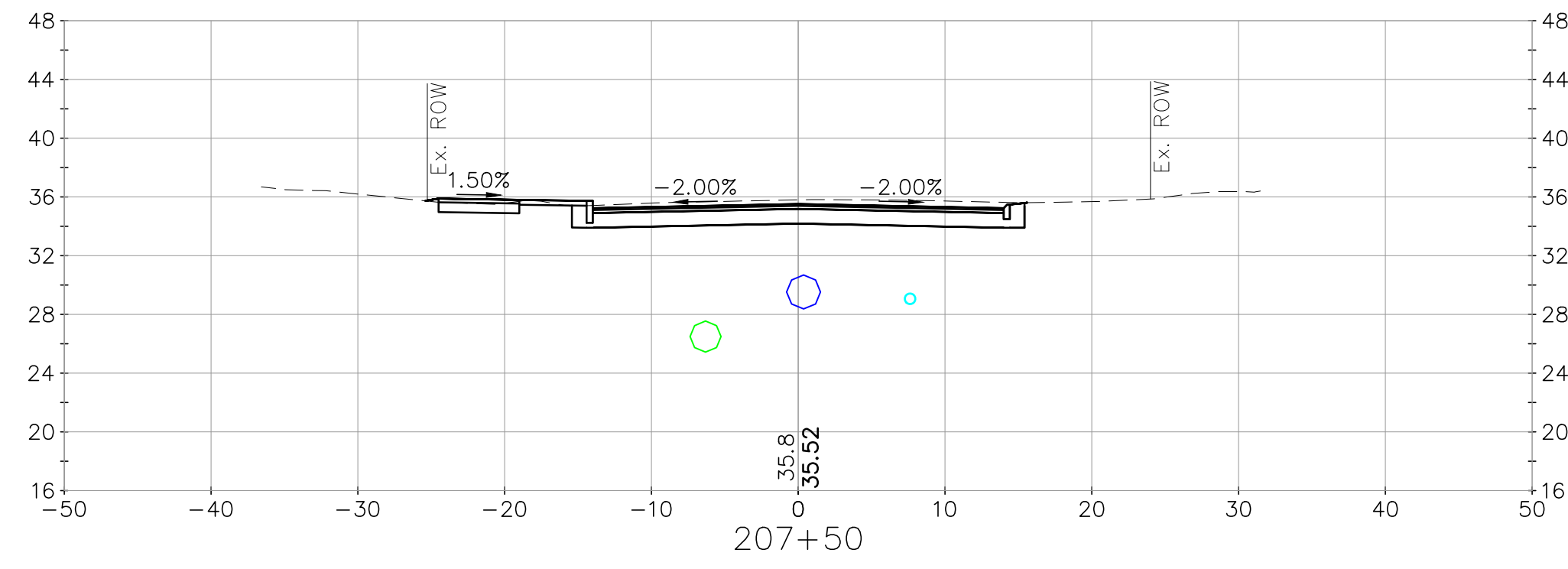



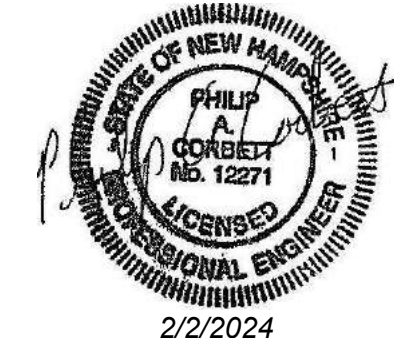


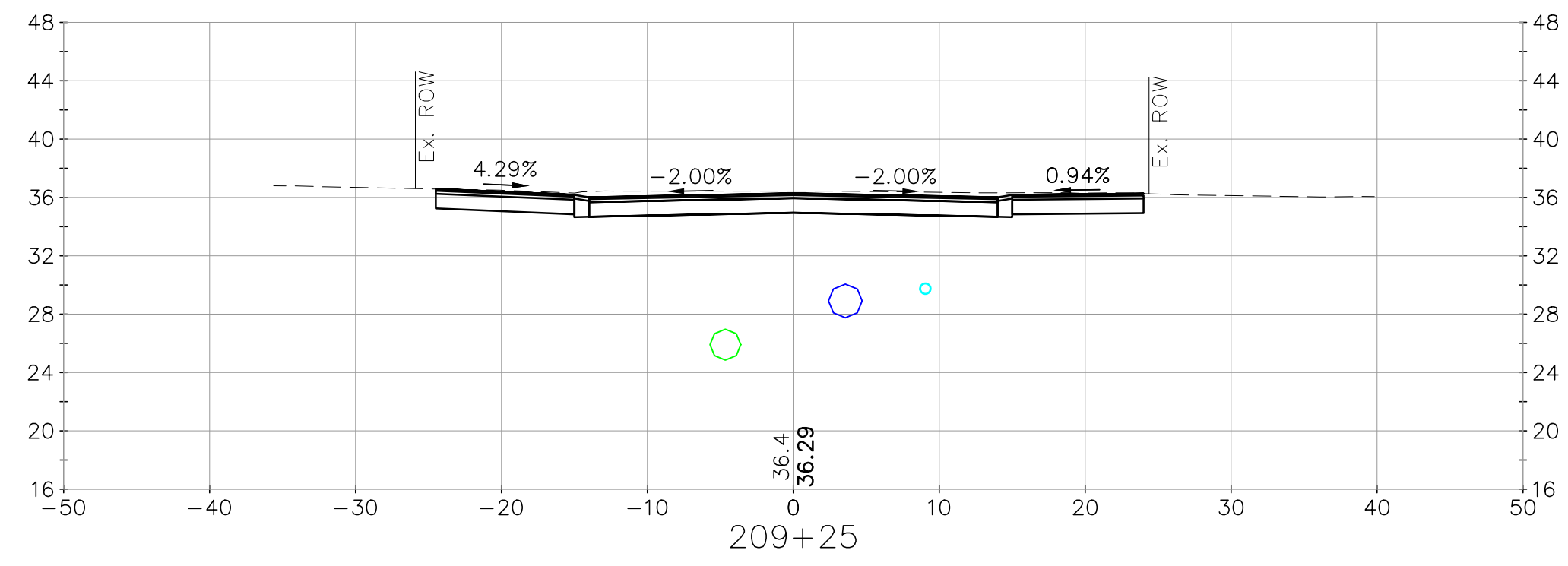
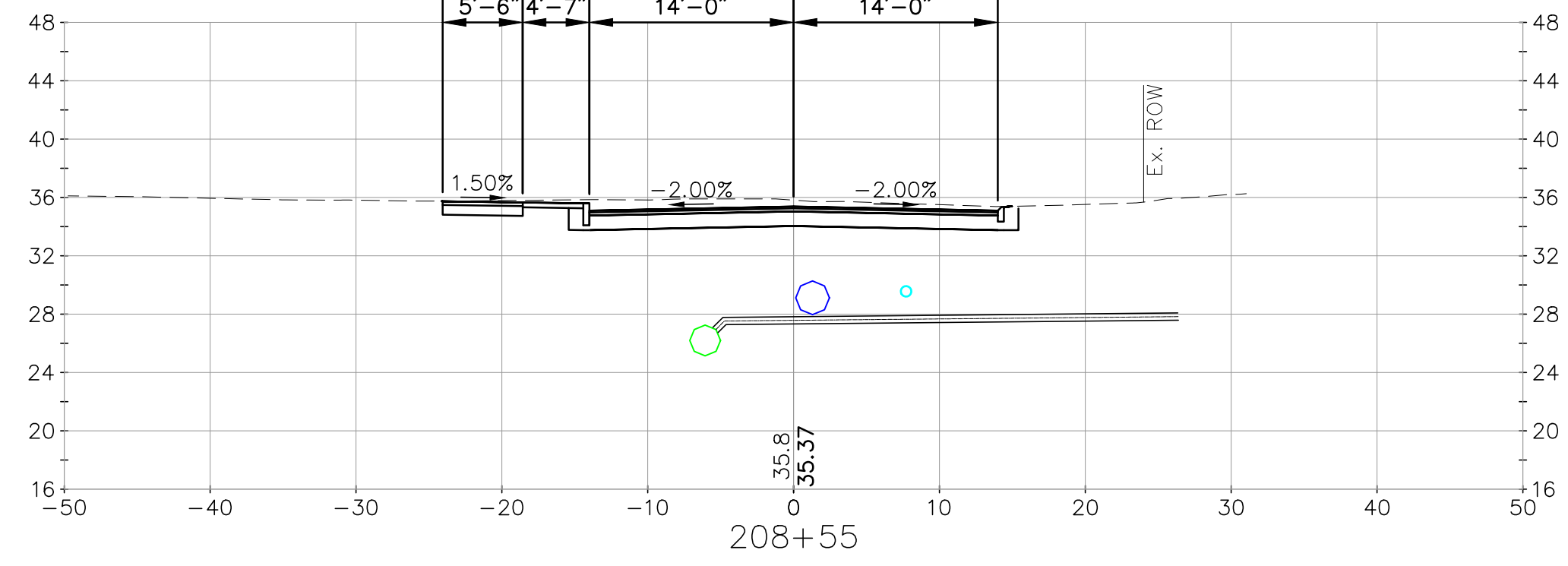
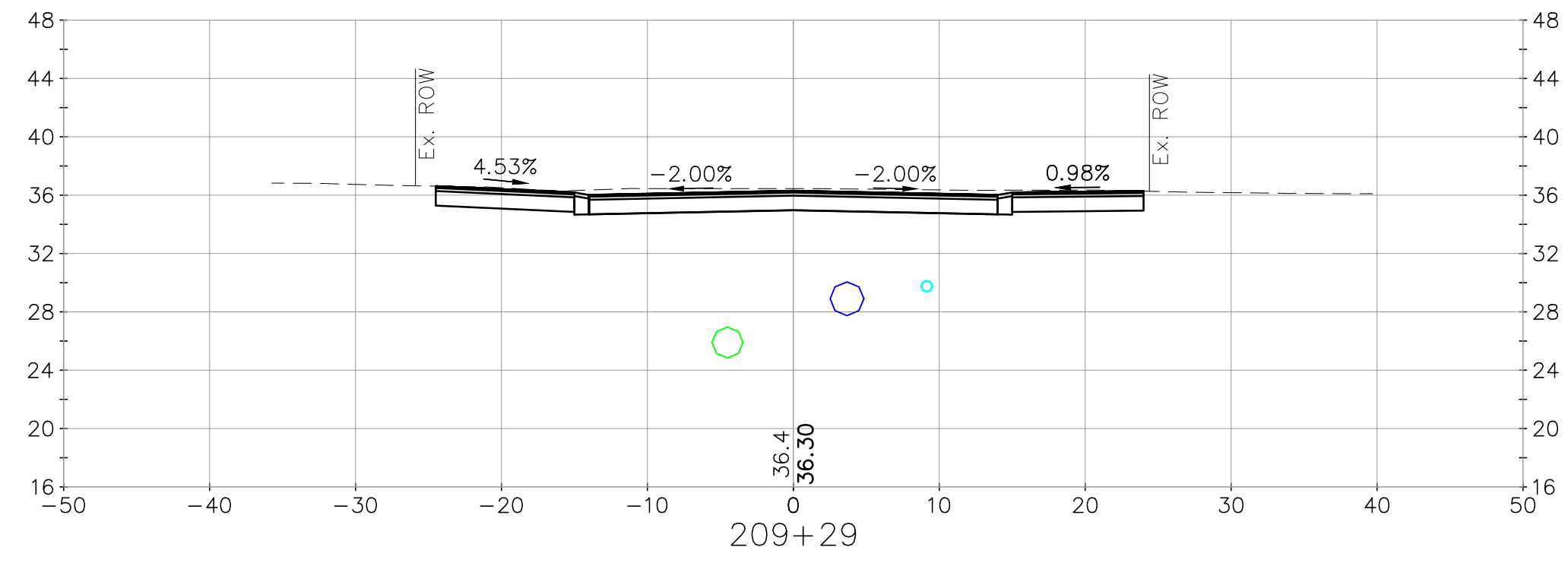
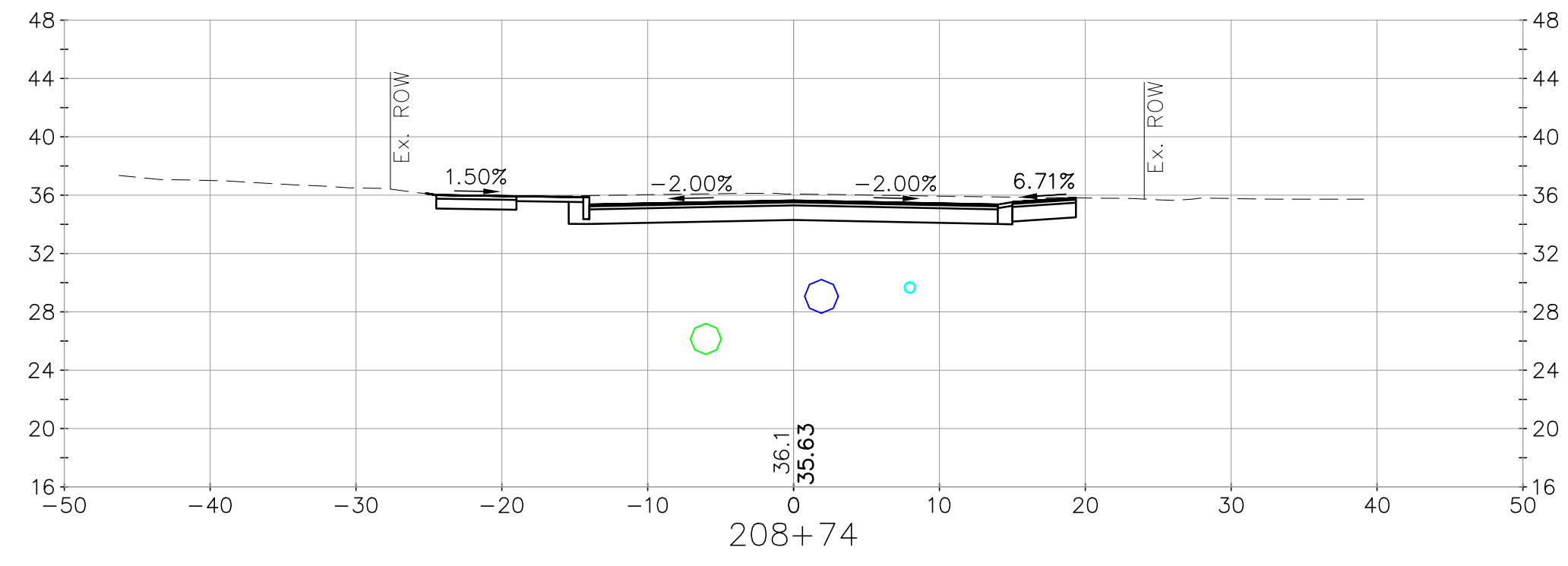
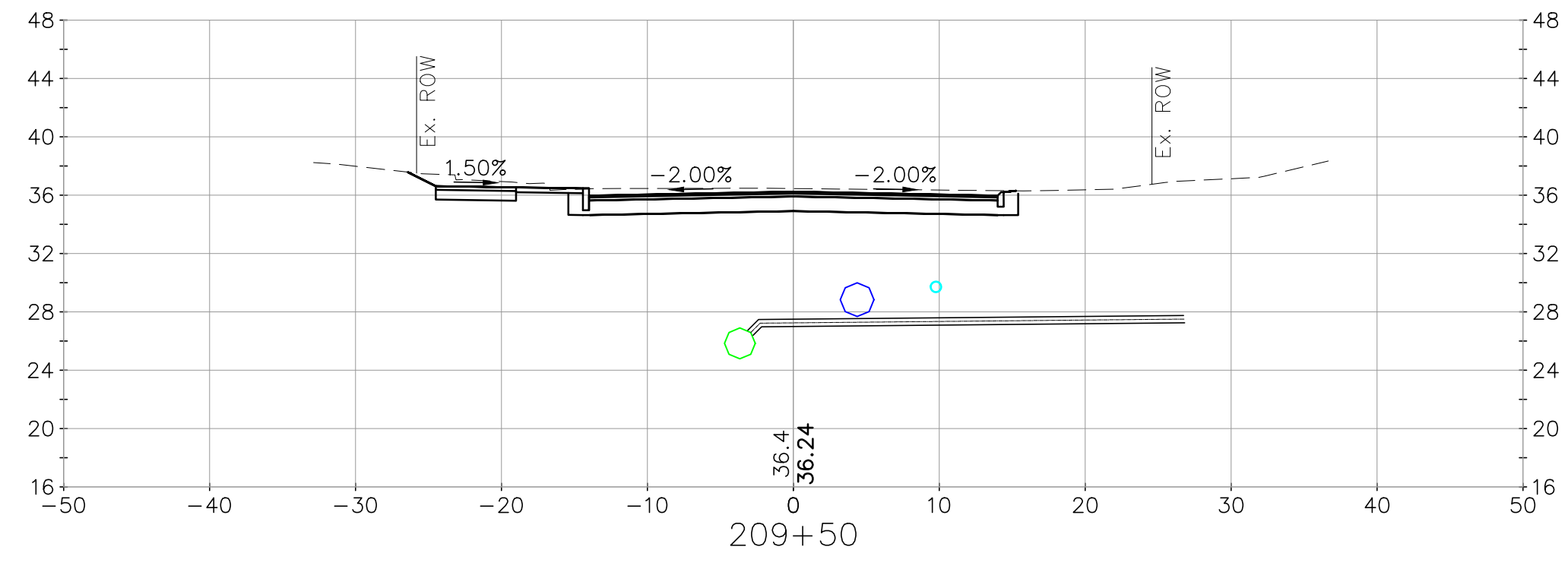
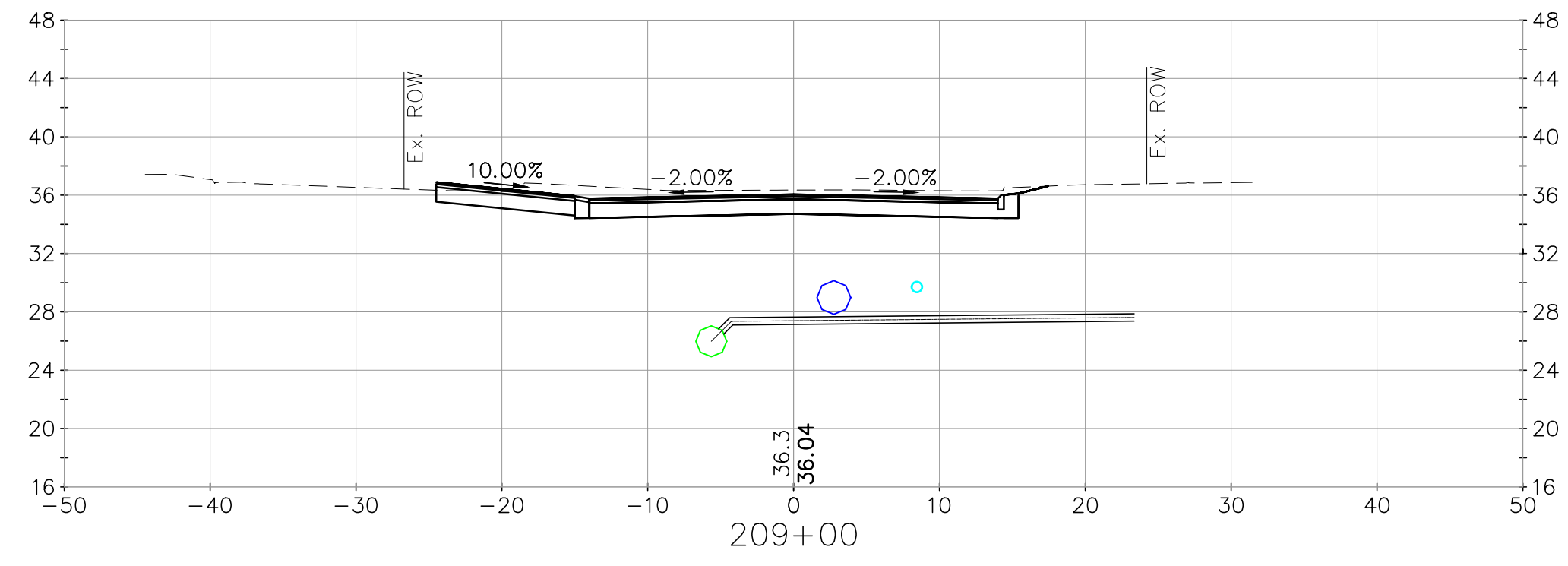
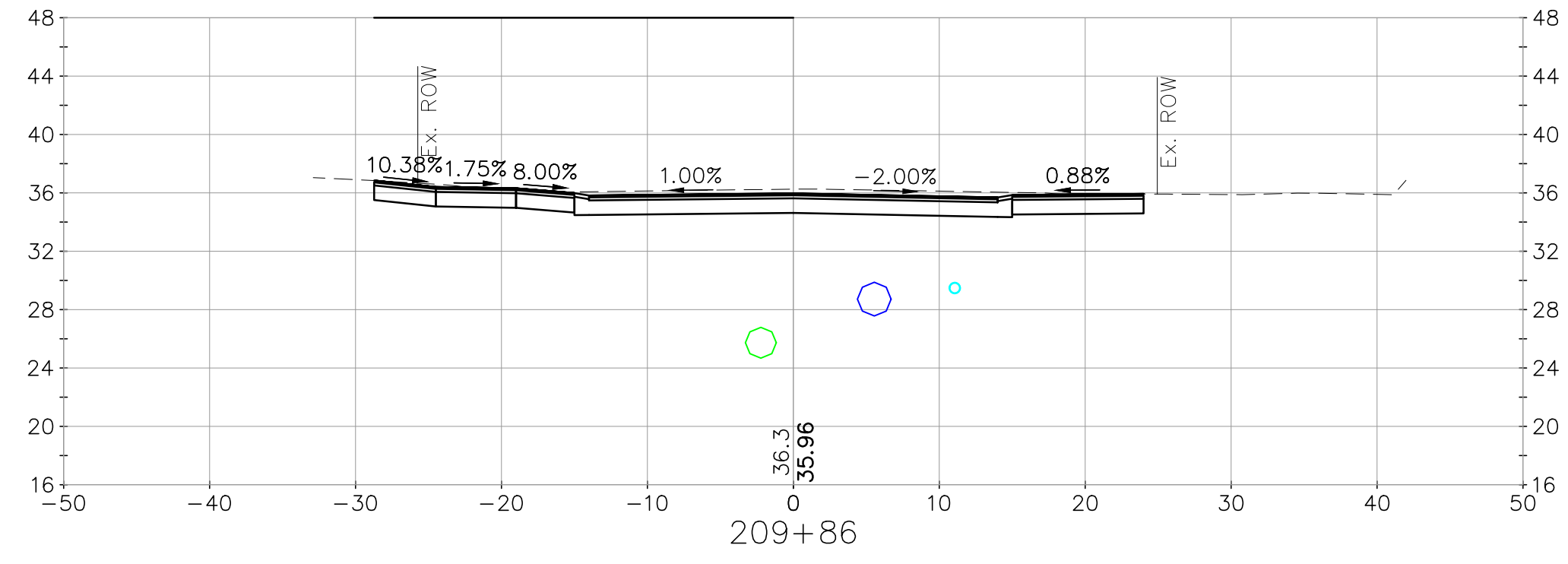
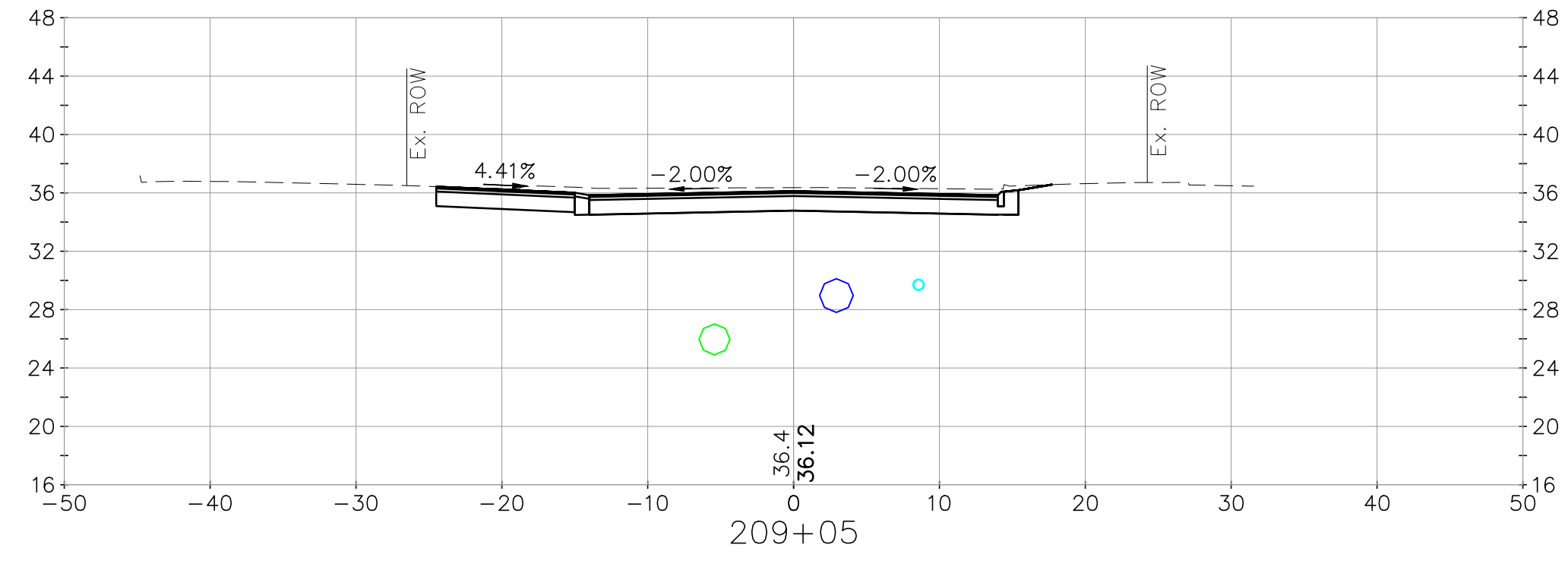
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 2/2/2024		designed by: CFC/SIF drawn by: WWG approved by: PAC		date: February 2024 project no: 1211 checked by: PAC	
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project		Cross Sections Orchard Street	
drawing no: <b>XS-11</b>		sheet: 47 of 55		revision: 1 no. 1 date: 2/2/2024 by: PAC	



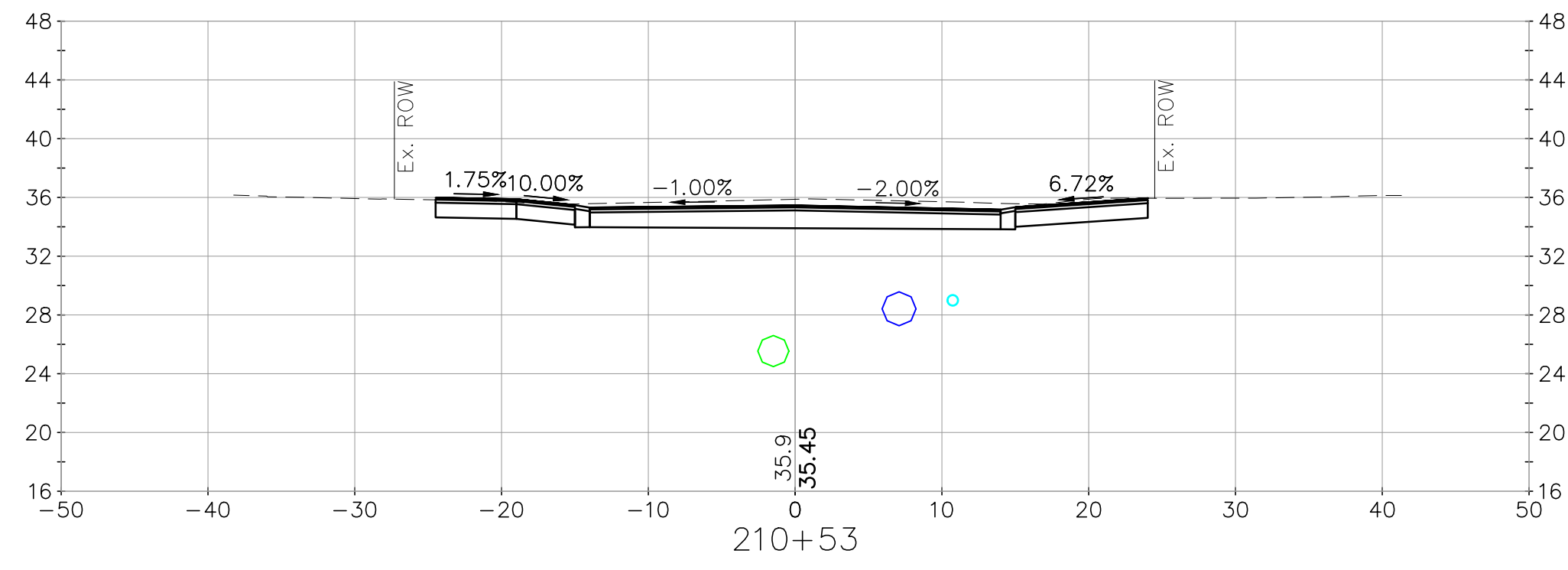
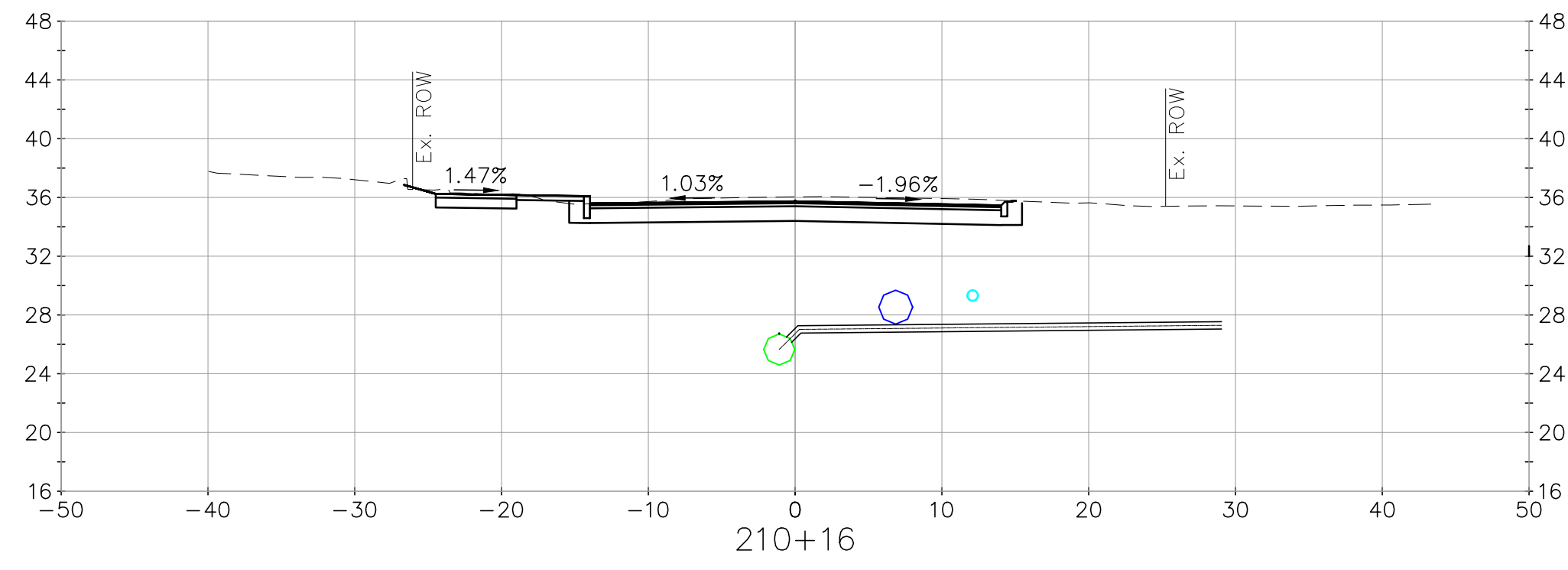
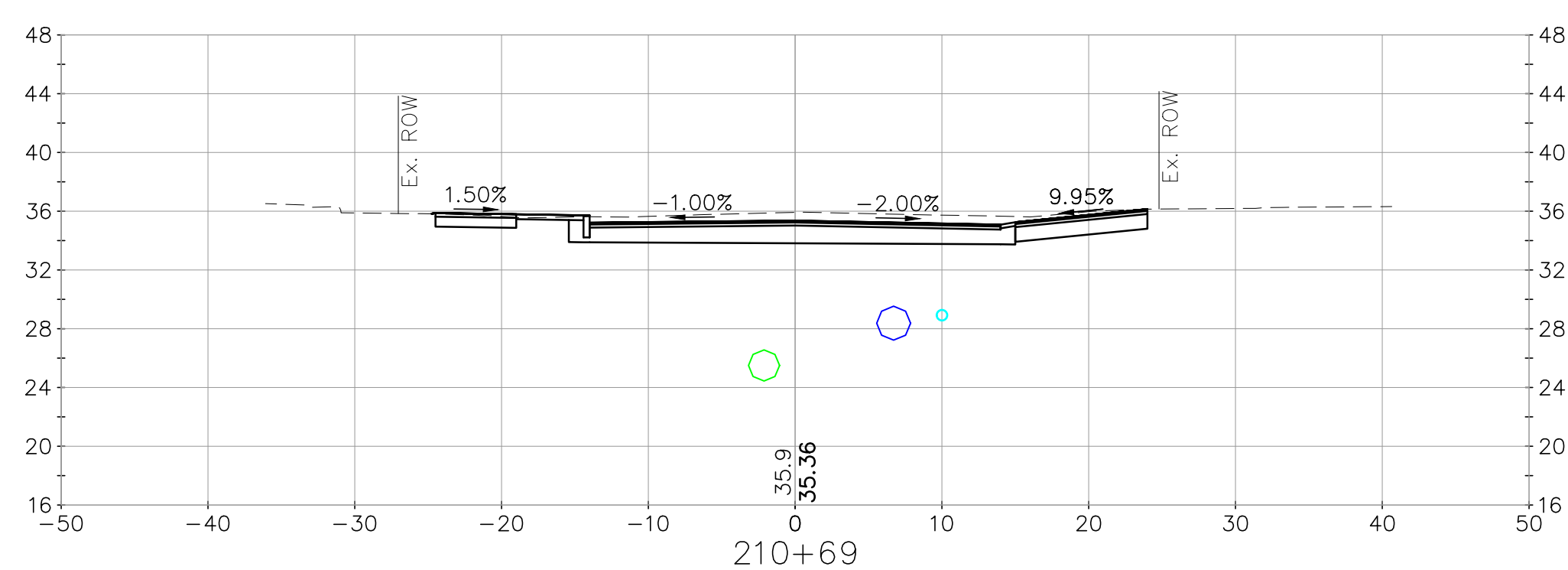
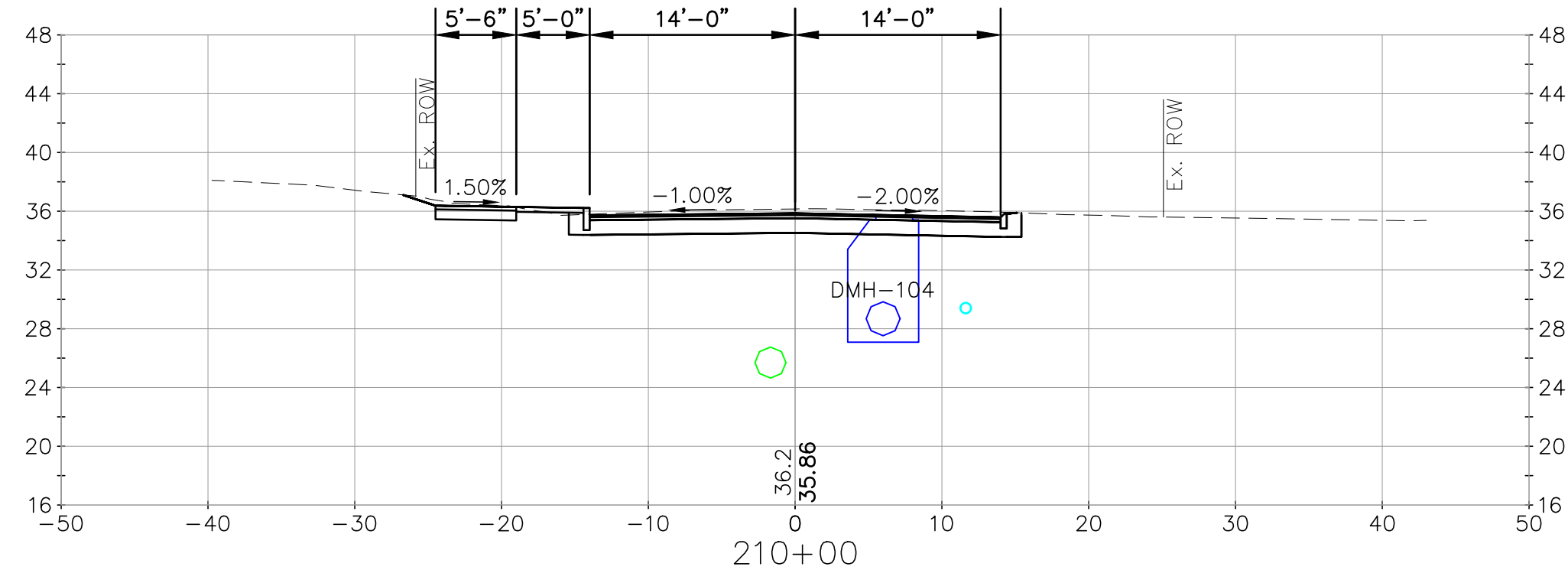
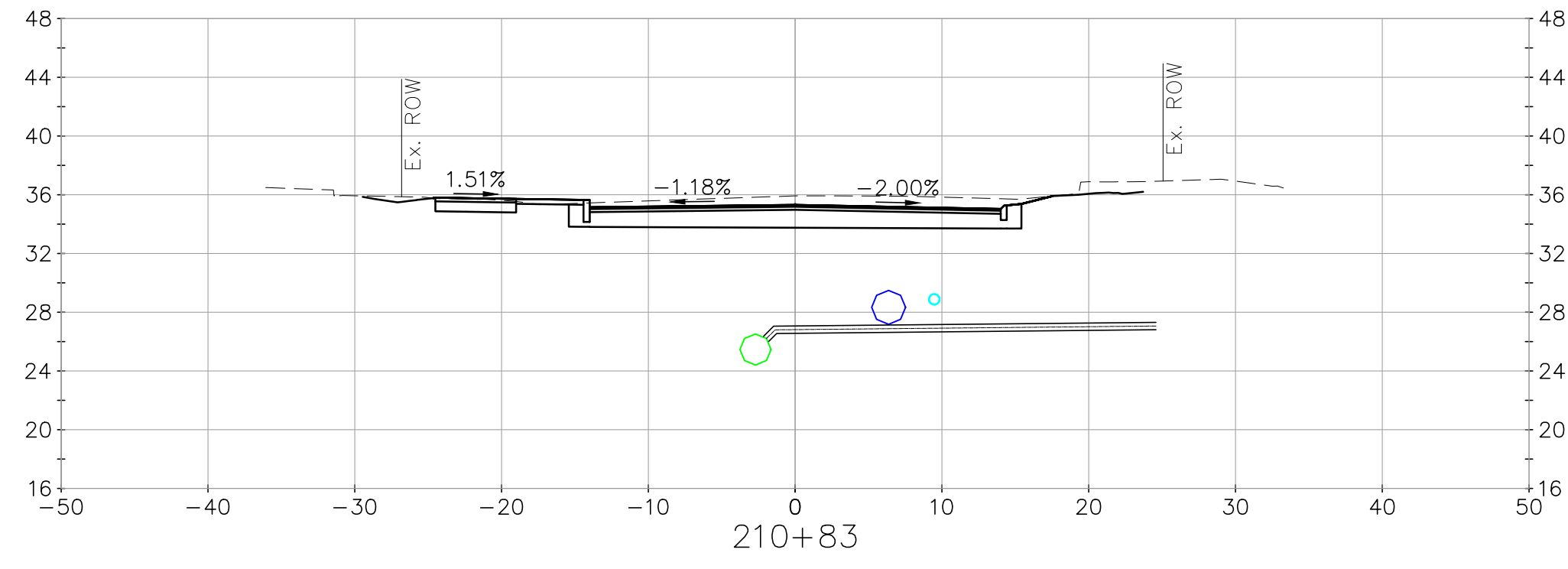
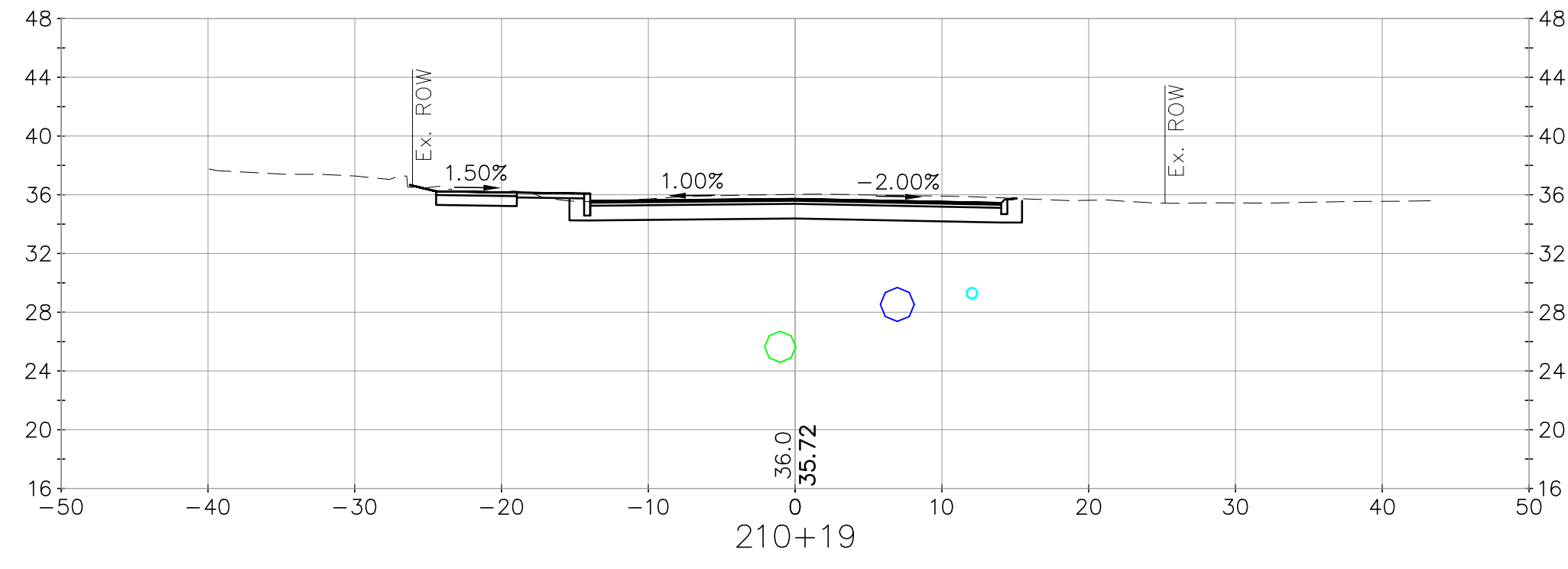
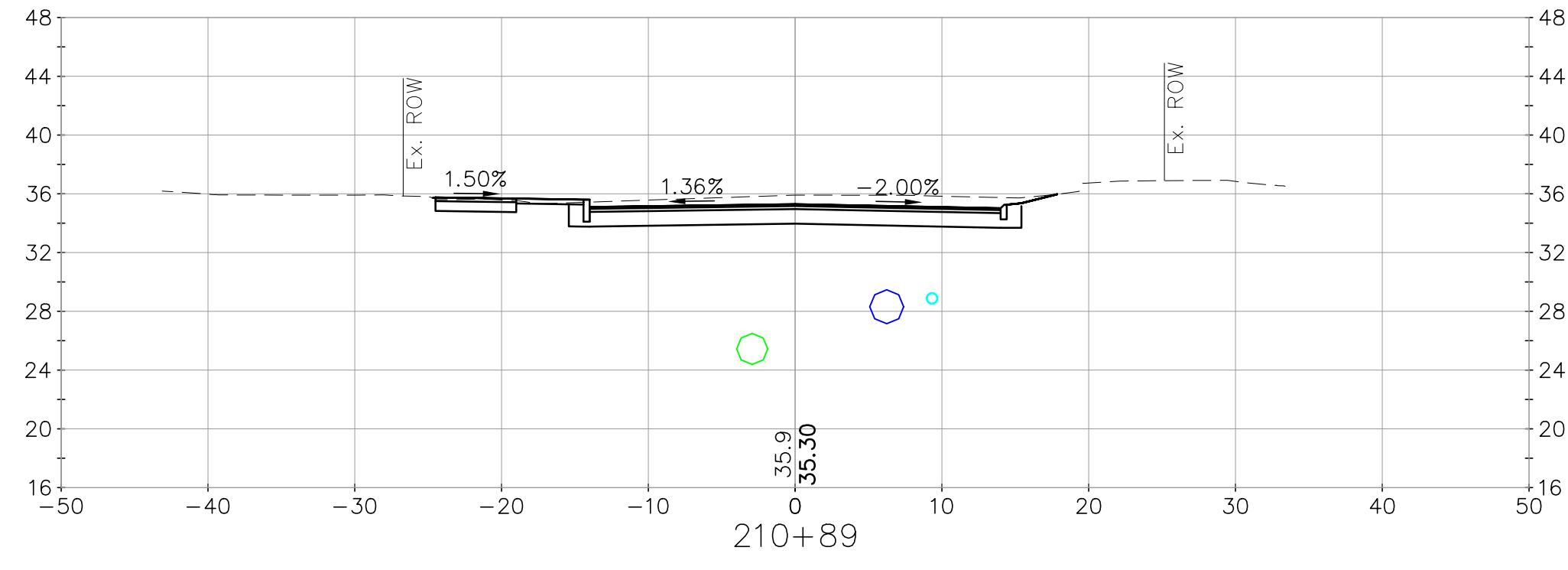
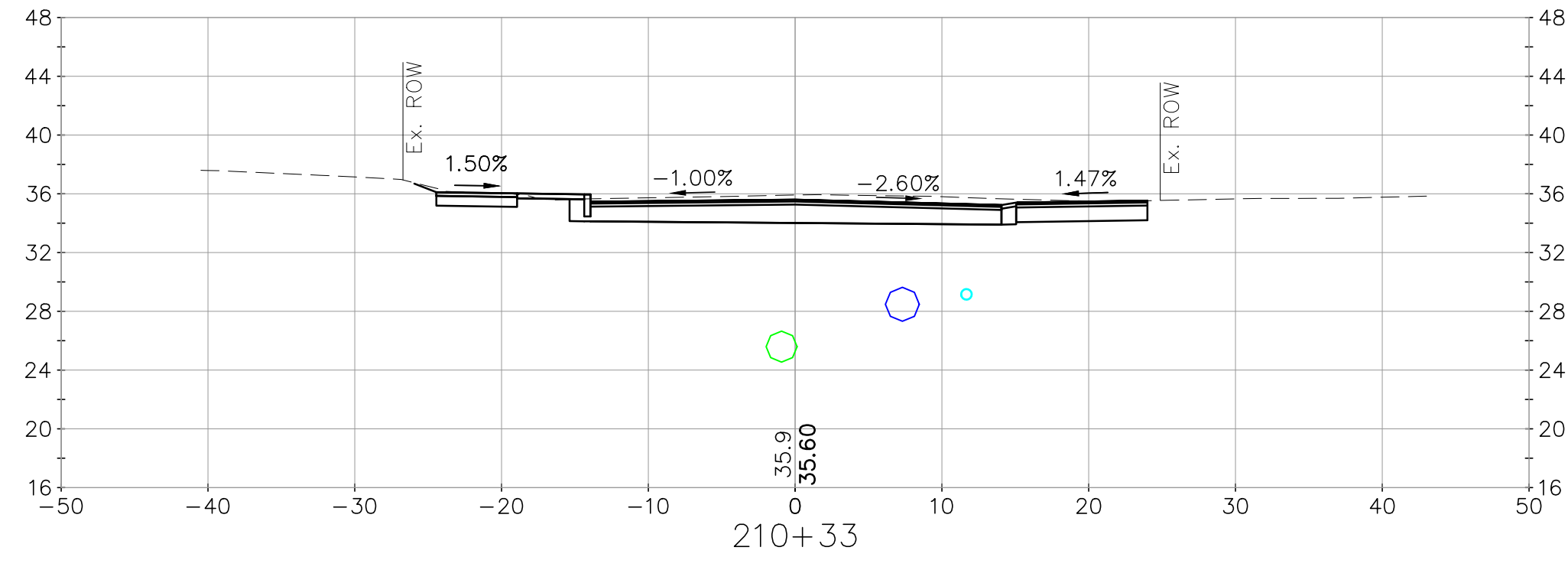
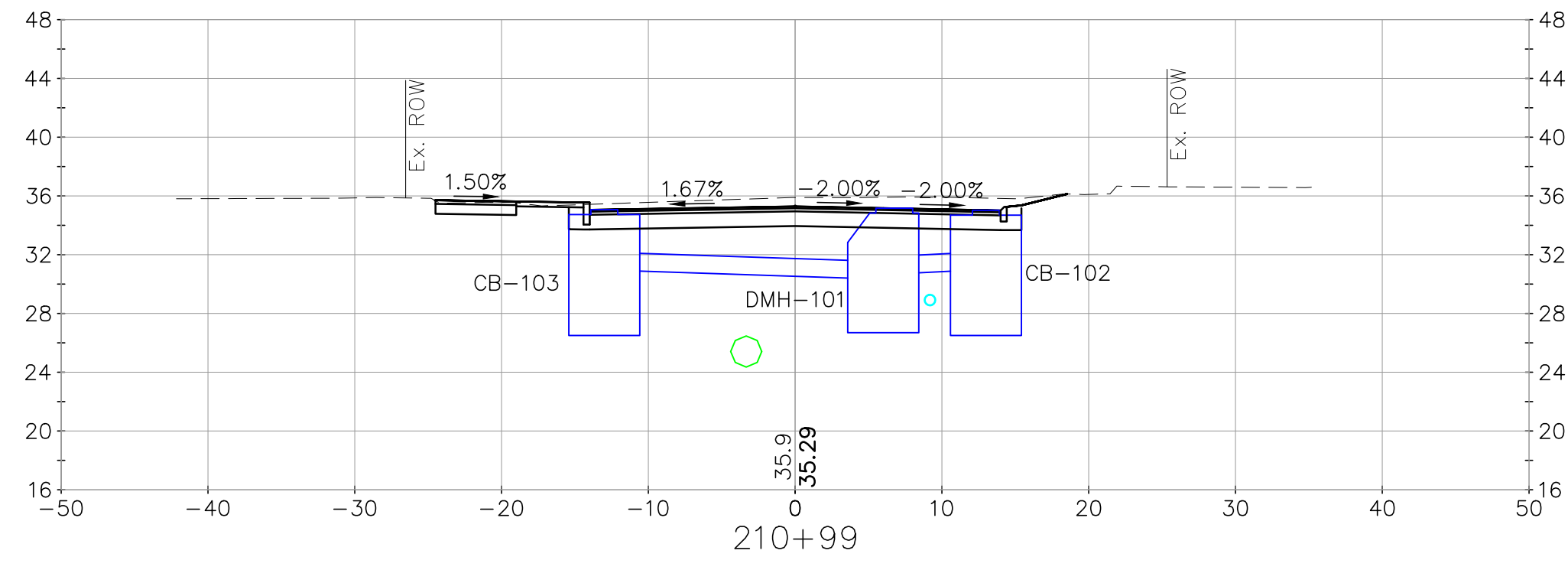
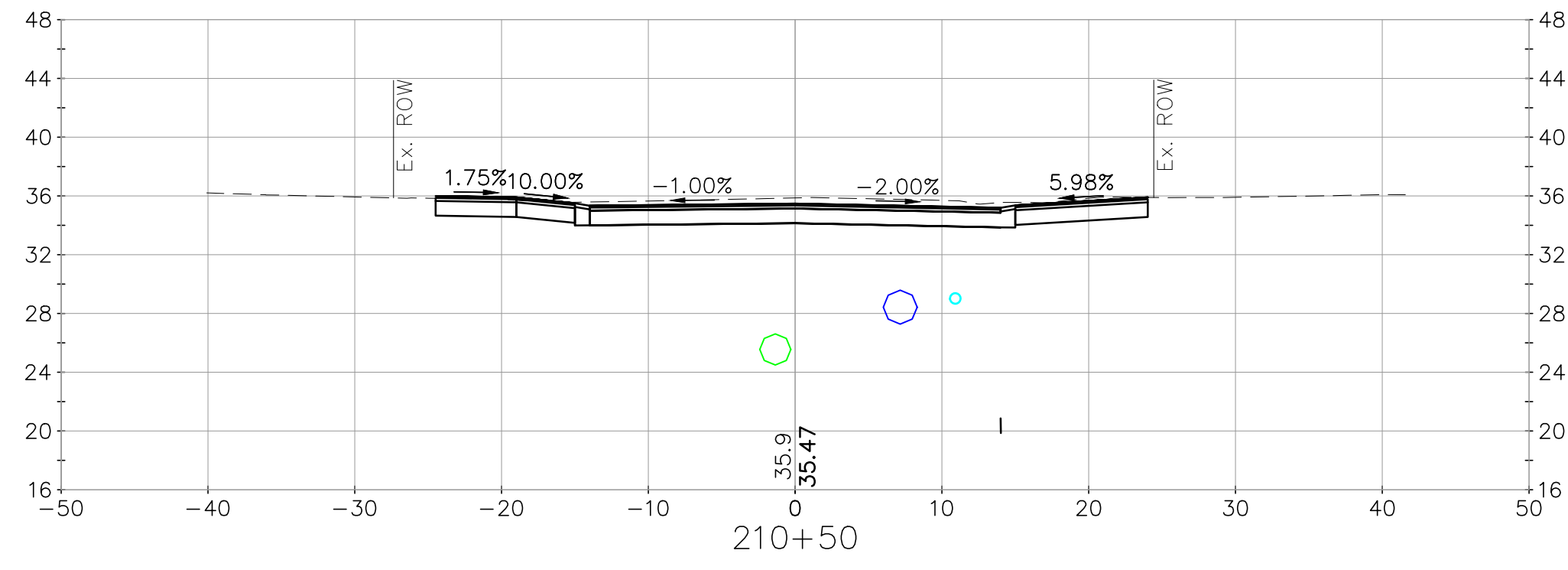




 CIVIL/ENVIRONMENTAL/STRUCTURAL		Portsmouth, NH 603/431-6196 Manchester, NH 603/627-0708 Portland, ME 207/641-4223		c m a e n g i n e e r s . c o m
 2/2/2024		designed by: CFC/SJF drawn by: WWG approved by: PAC		date: February 2024 project no: 1211 checked by: PAC
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project		Cross Sections Orchard Street
drawing no. <b>XS-13</b>		scale: 1" = 10' 1" = 20'		revision no. 1 date 2/2/2024 by PAC
sheet: 49 of 55				



<p style="text-align: center; font-size: small;"> <b>CMA ENGINEERS</b>          CIVIL/ENVIRONMENTAL/STRUCTURAL          Portsmouth, NH 603/431-6196 • 603/627-0708 • 207/641-4223          Manchester, NH • Portland, ME          c m a e n g i n e e r s . c o m       </p>				
date: February 2024	designed by: CFC/STF	drawn by: WWG	approved by: PAC	scale: 1" = 10' 10' 20'
project no: 1211	checked by: PAC	revision no. 1 date 2/2/2024 Issued for Bid		
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project Cross Sections Orchard Street		
drawing no. <b>XS-14</b>				
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revision	no.	date	by
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 Portland, ME 207/641-4223  
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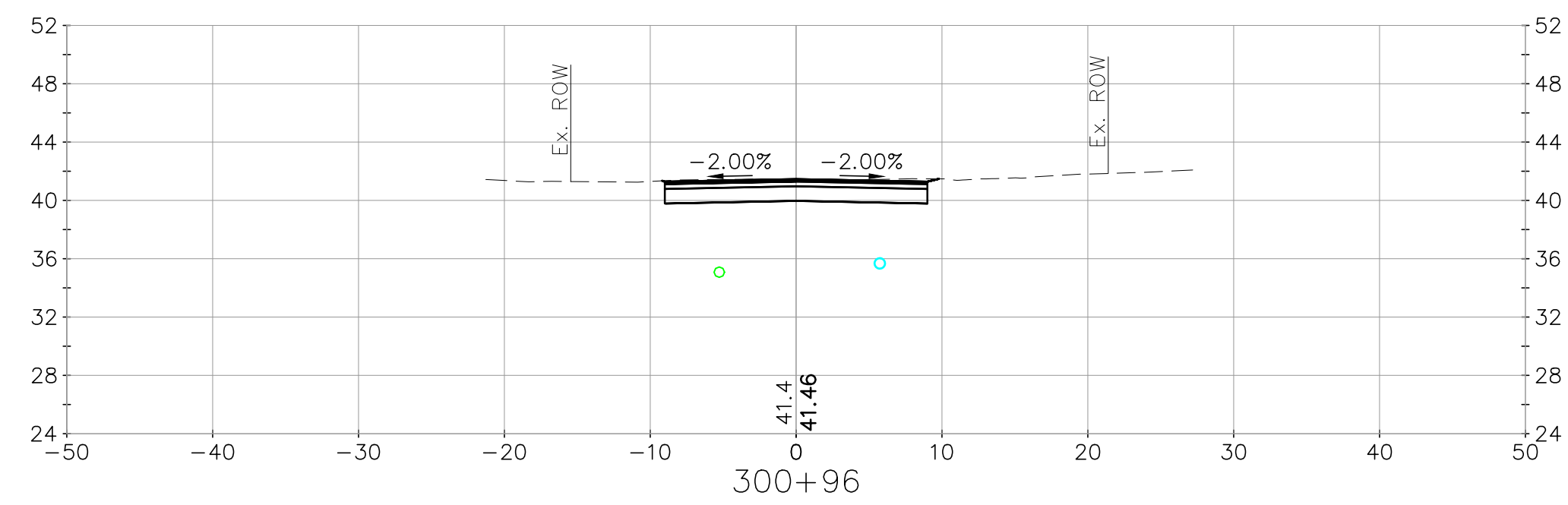
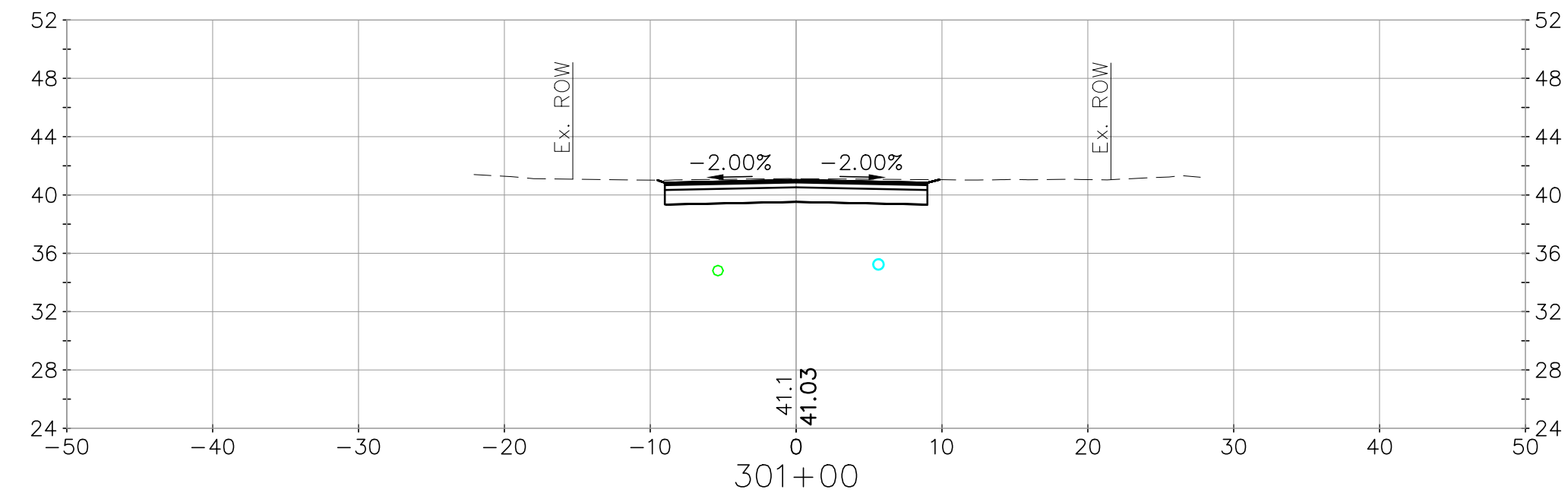
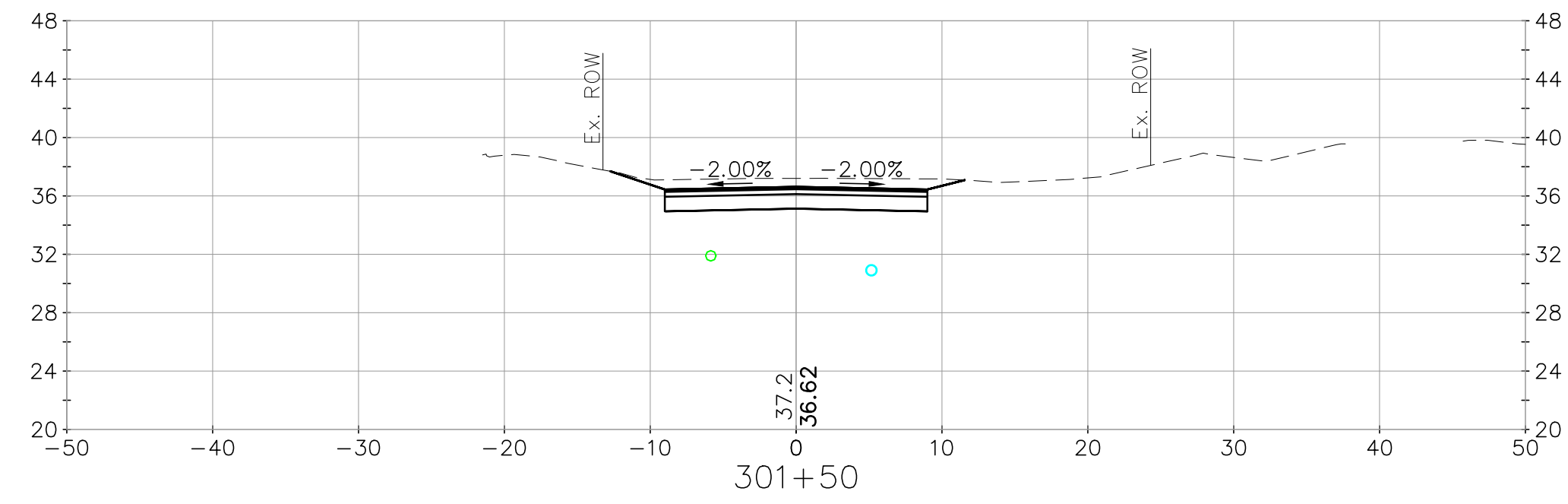
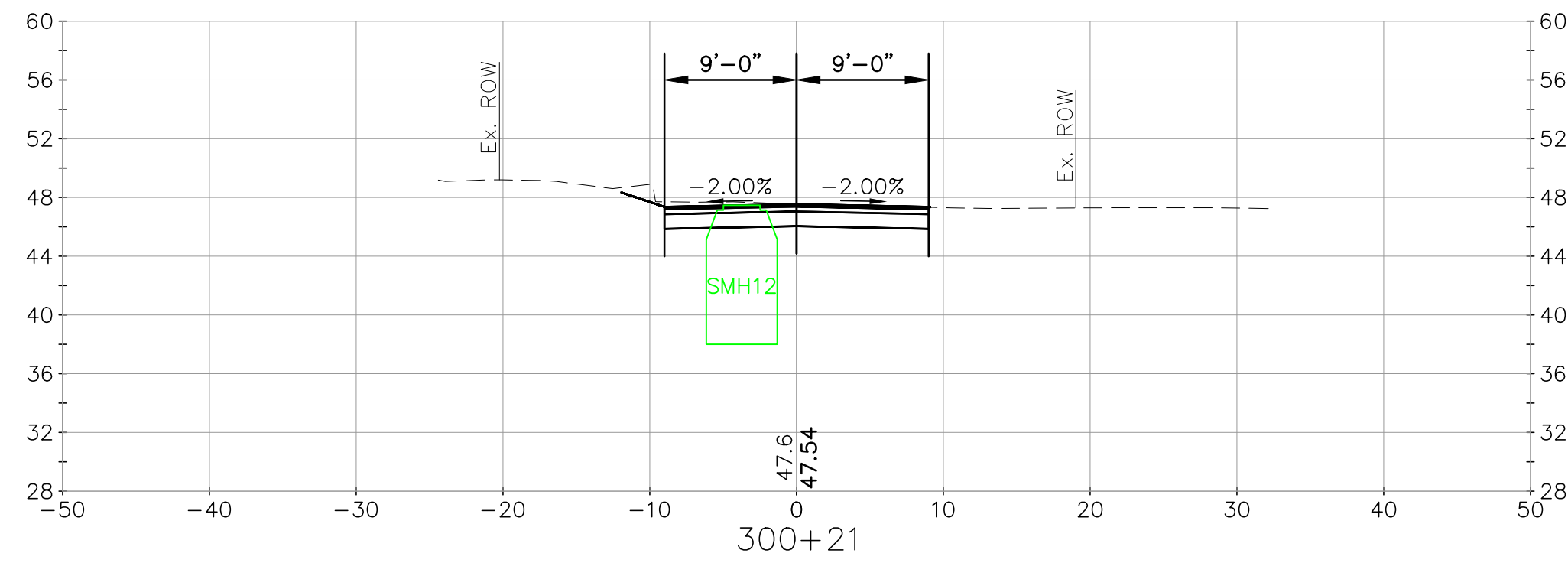
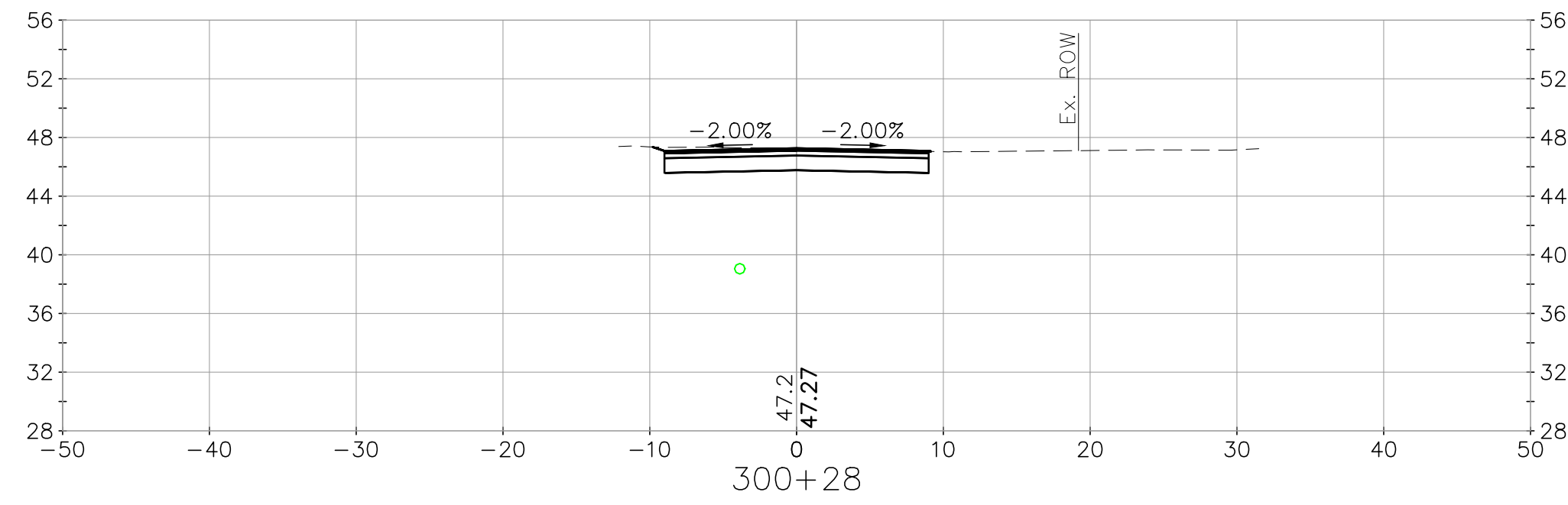
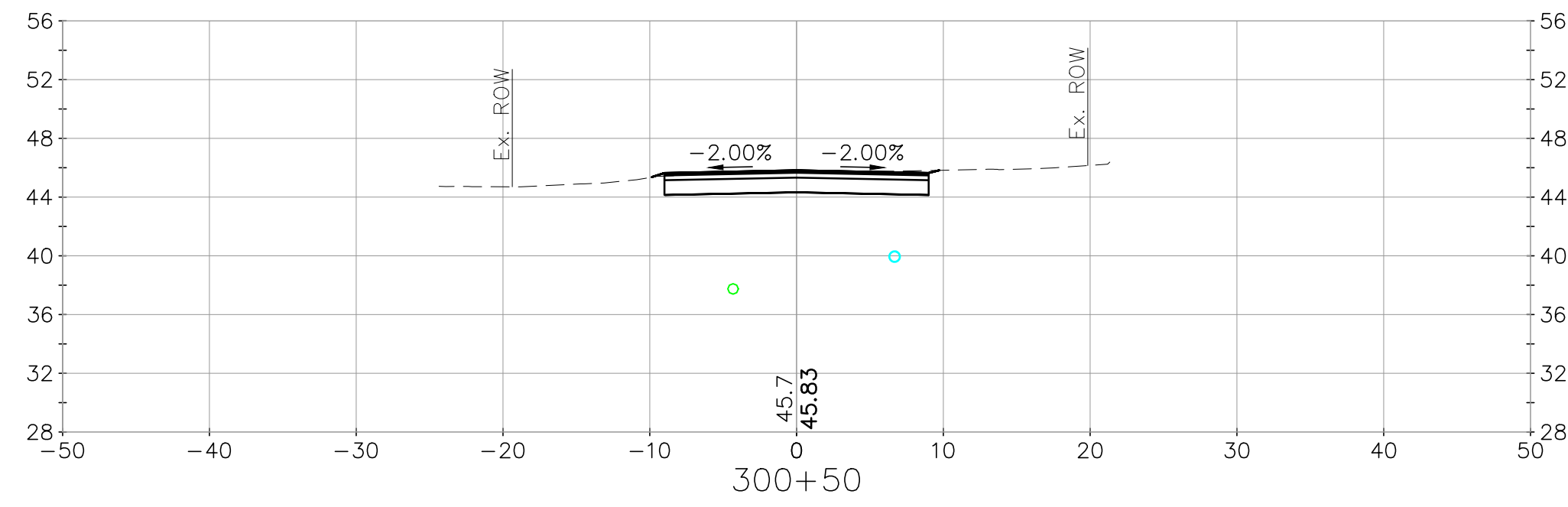
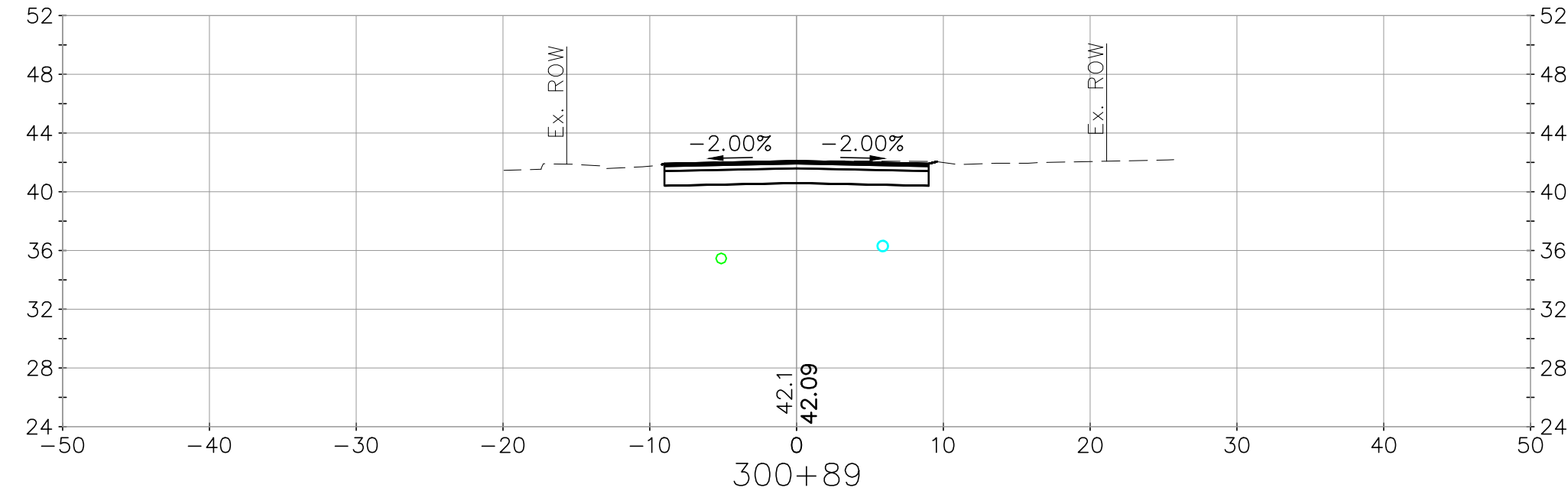
date:	February 2024	designed by:	CFC/STF
project no.:	1211	drawn by:	WWG
checked by:	PAC	approved by:	PAC

scale: 1" = 10'  
 0 10' 20'

City of Portsmouth, New Hampshire  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Cross Sections  
 Orchard Street

drawing no.  
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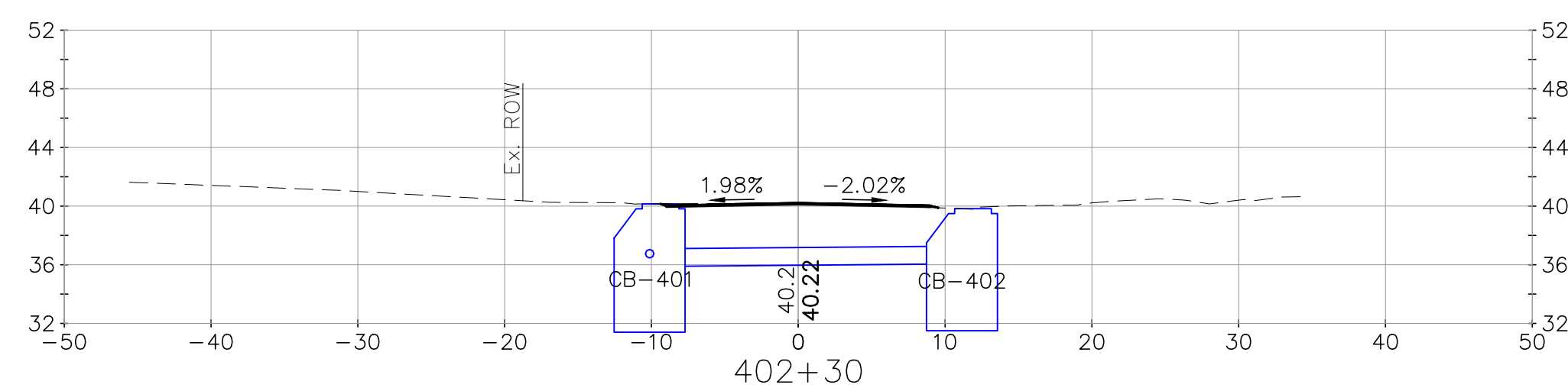
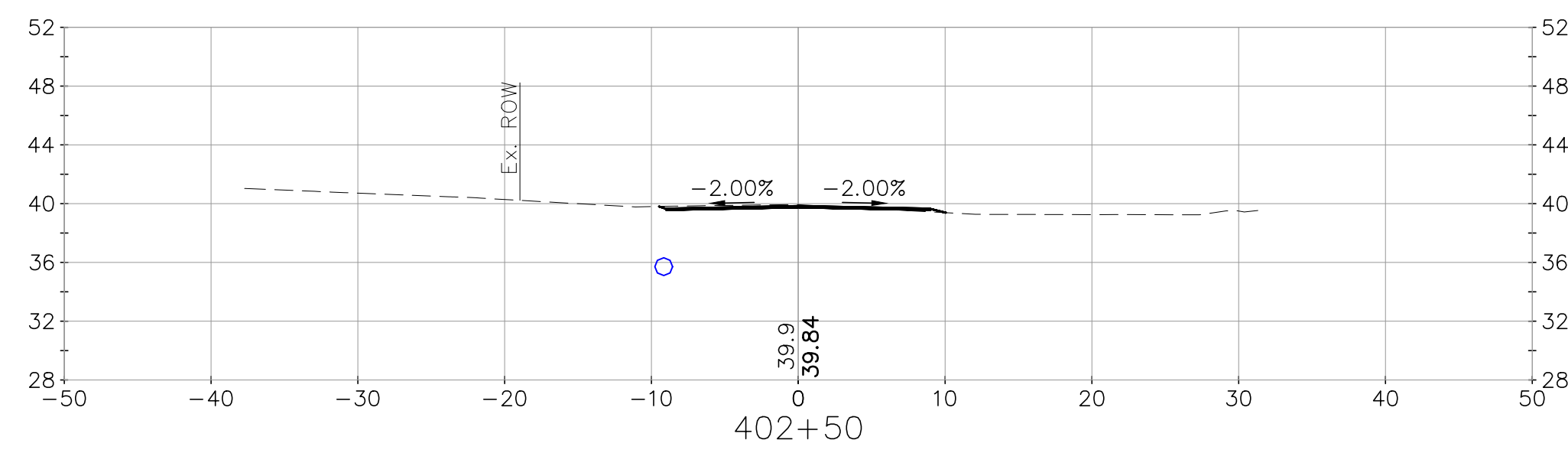
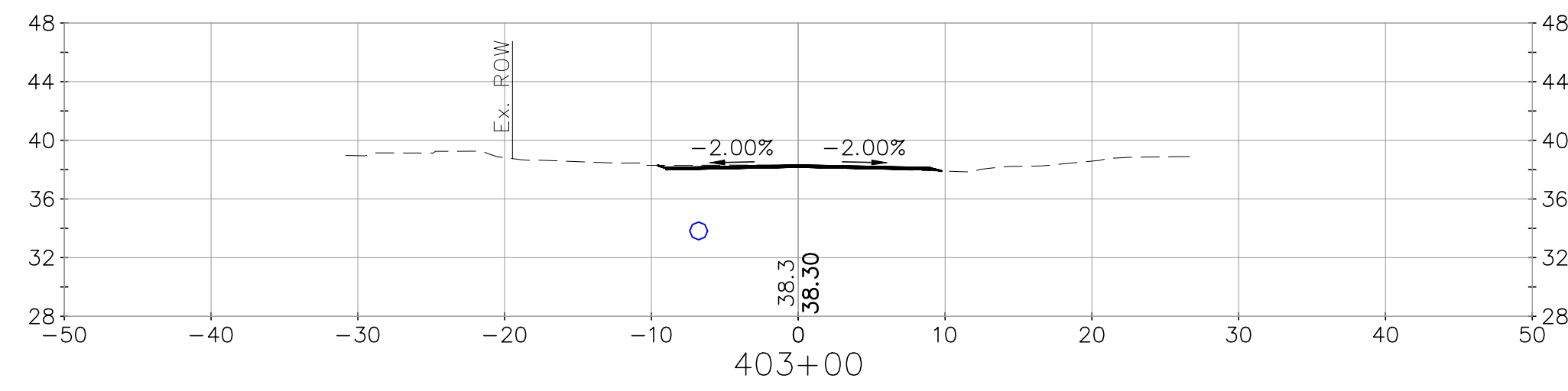
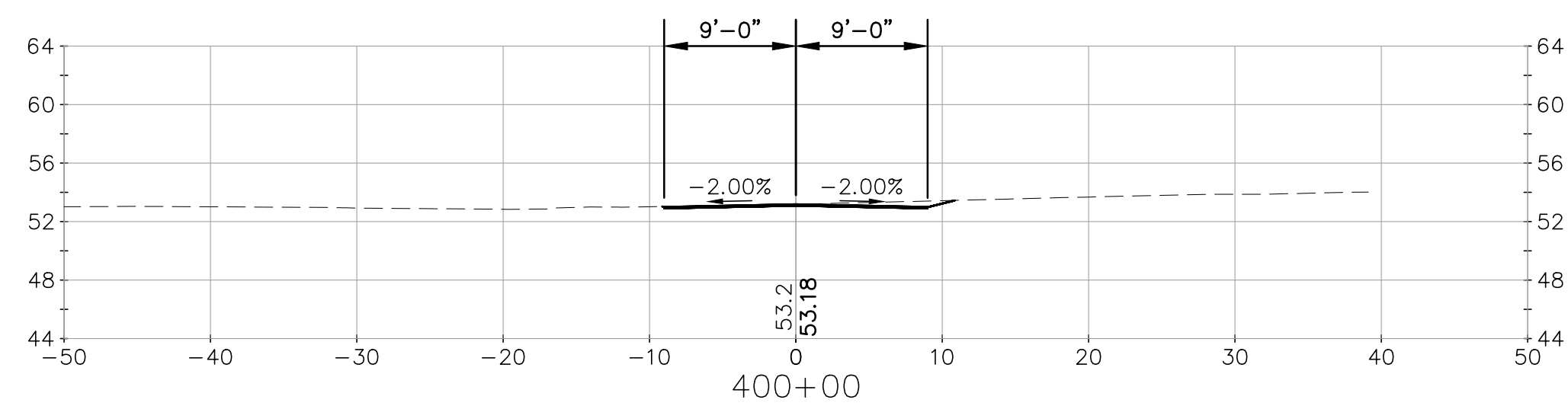
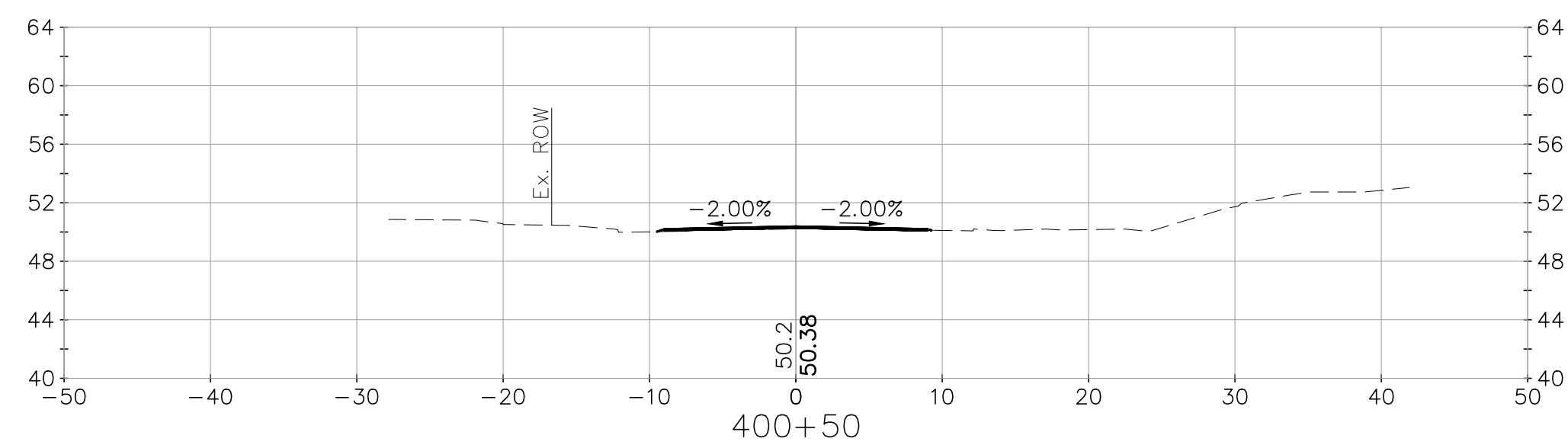
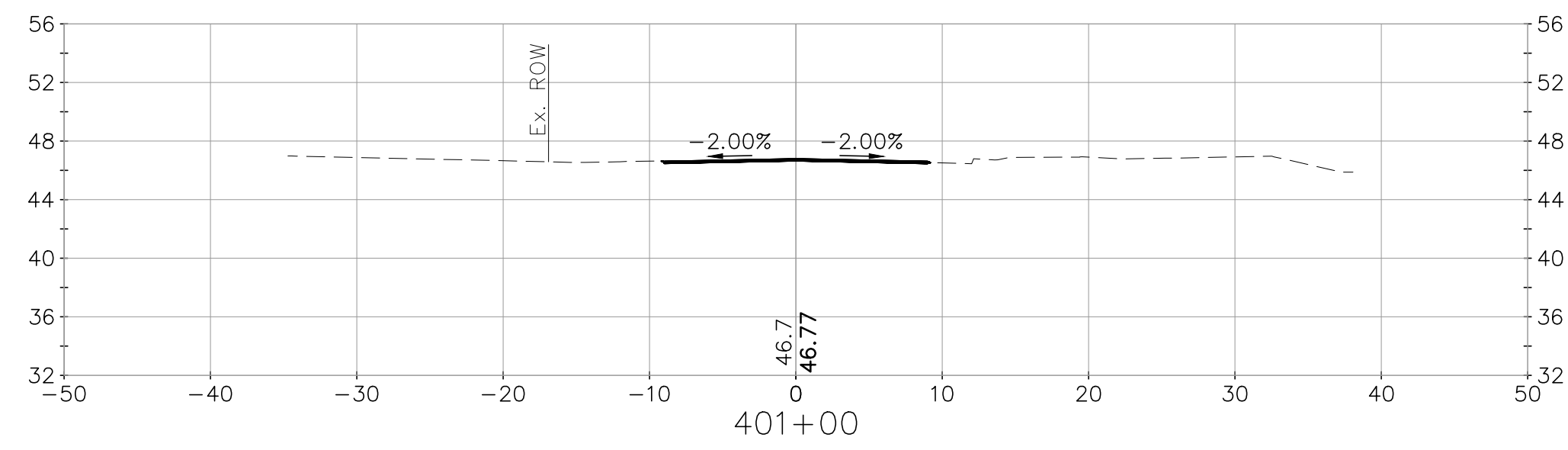
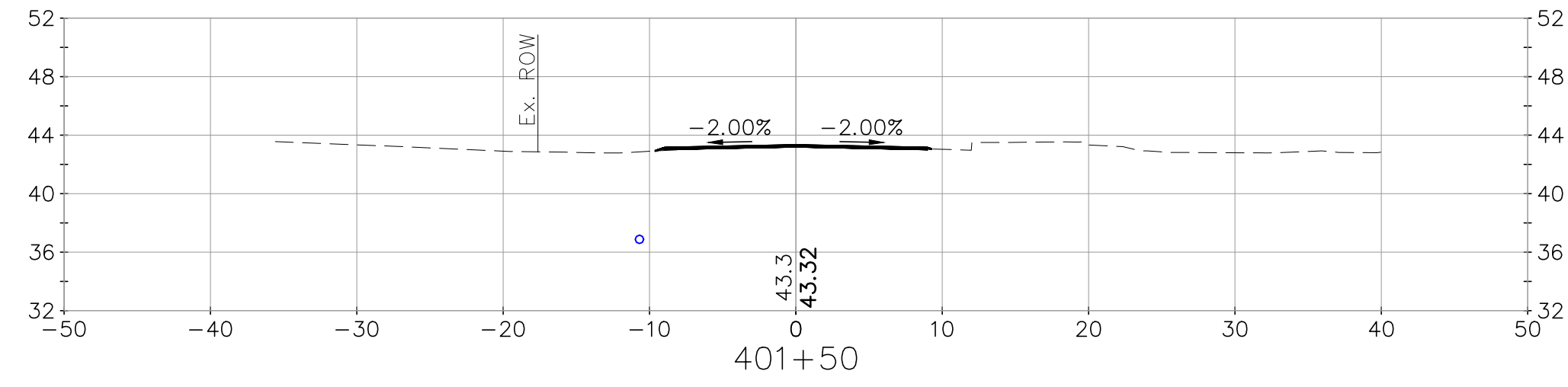
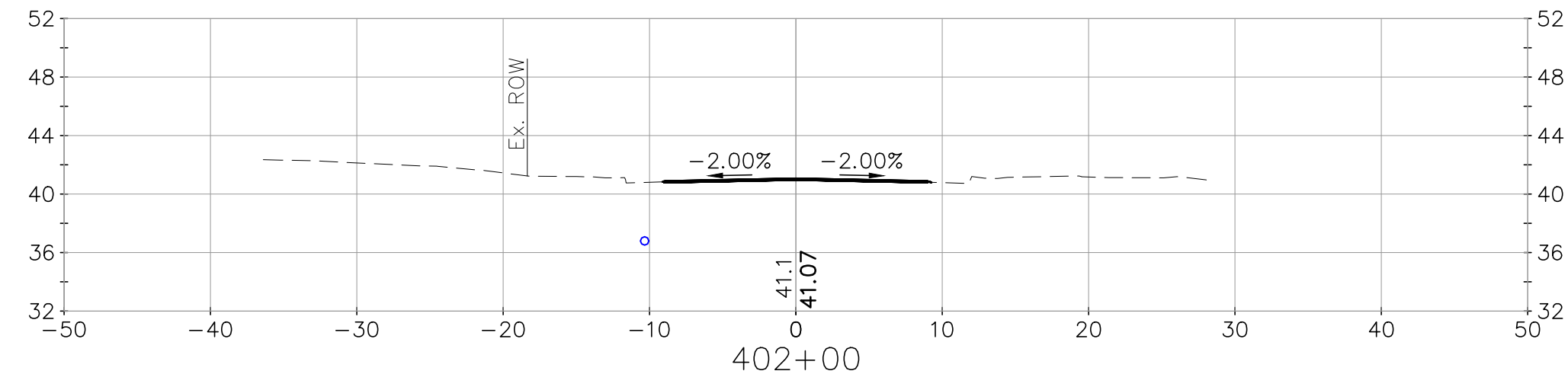


date:	February 2024	designed by:	CFC/SIF
project no.:	1211	drawn by:	WVG
checked by:	PAC	approved by:	PAC

scale: 1" = 10'  
 0 10' 20'

City of Portsmouth, New Hampshire  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Cross Sections  
 Orchard Court

drawing no.  
**XS-17**  
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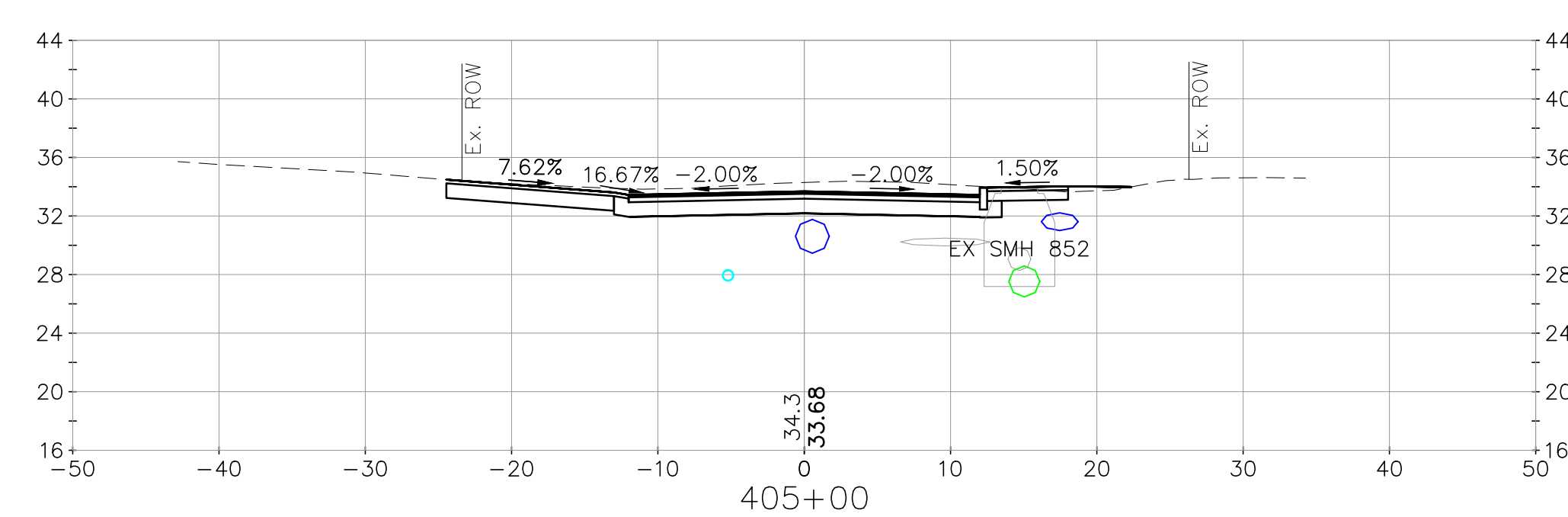
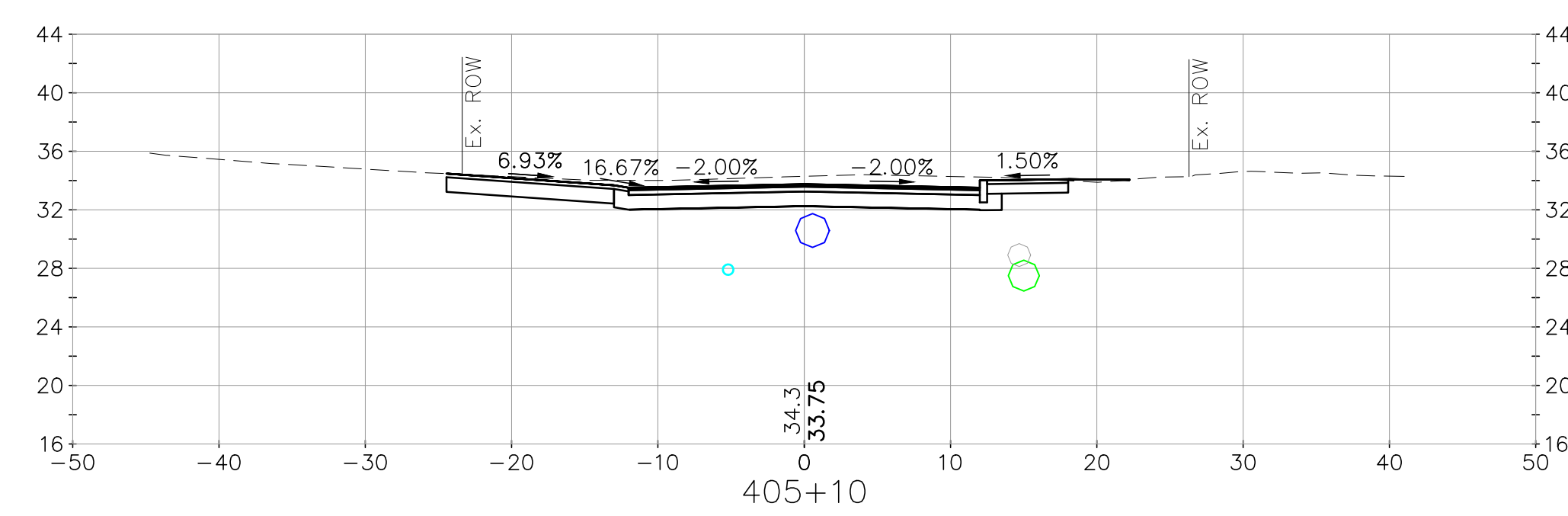
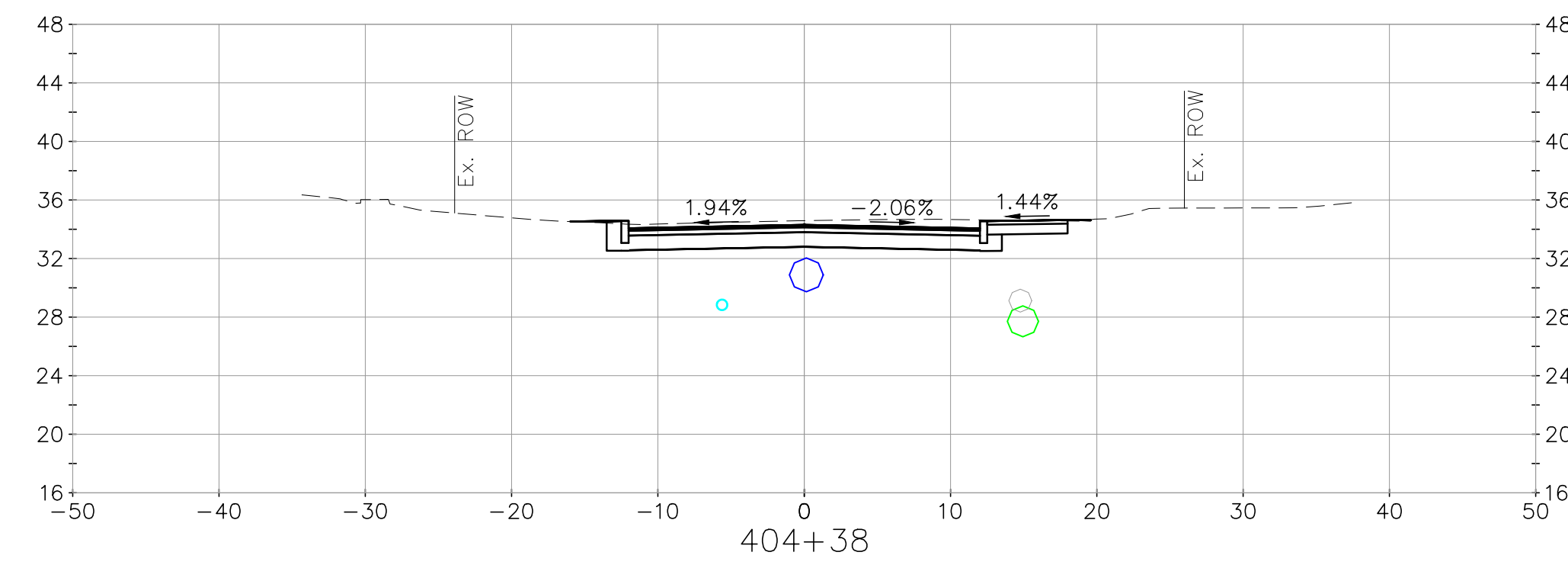
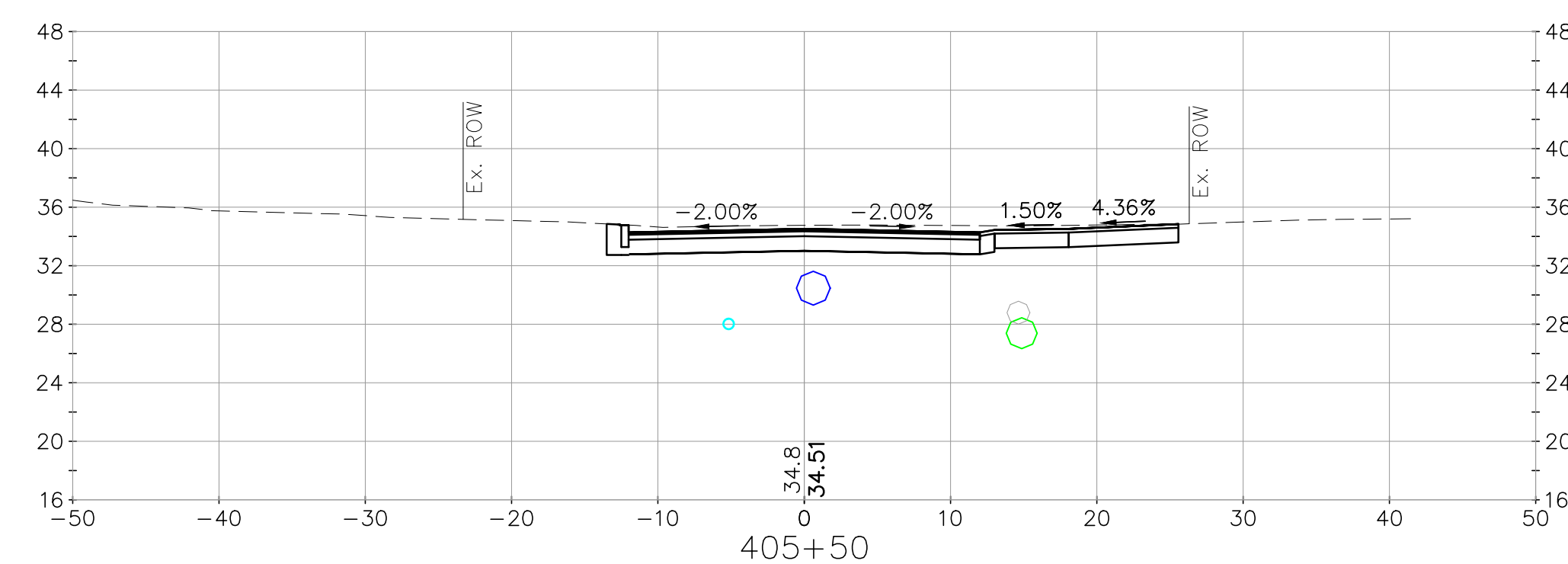
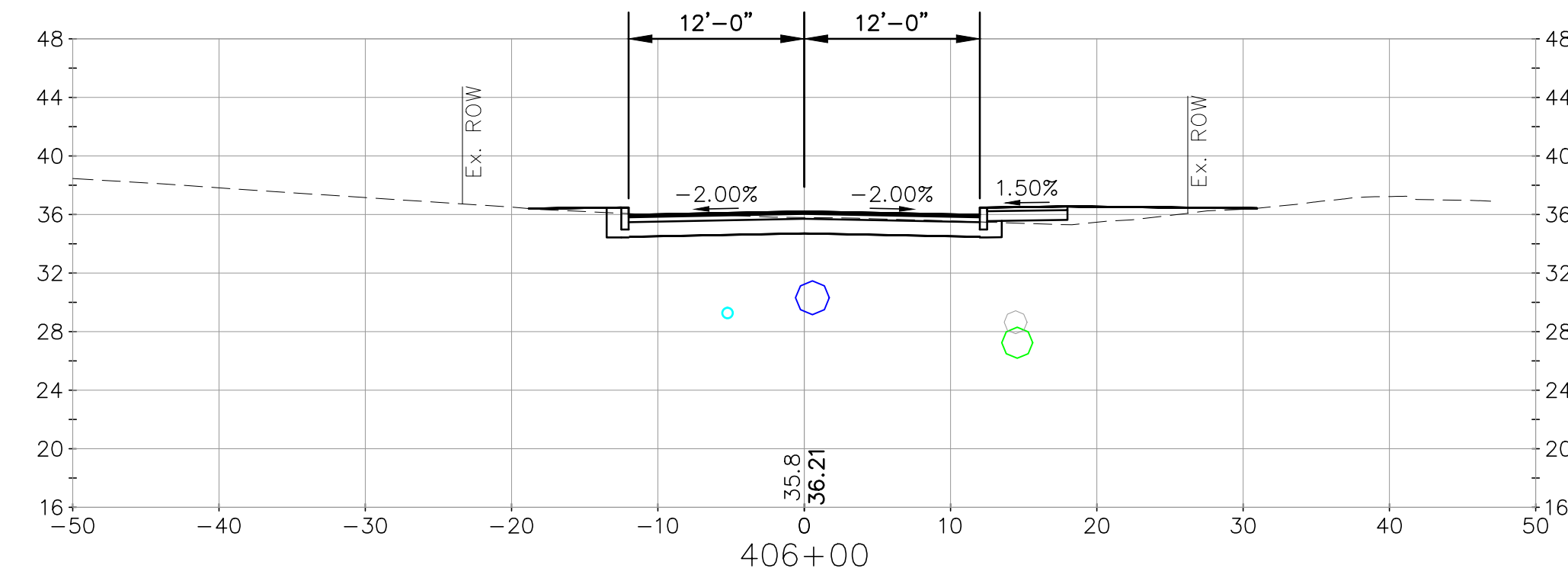
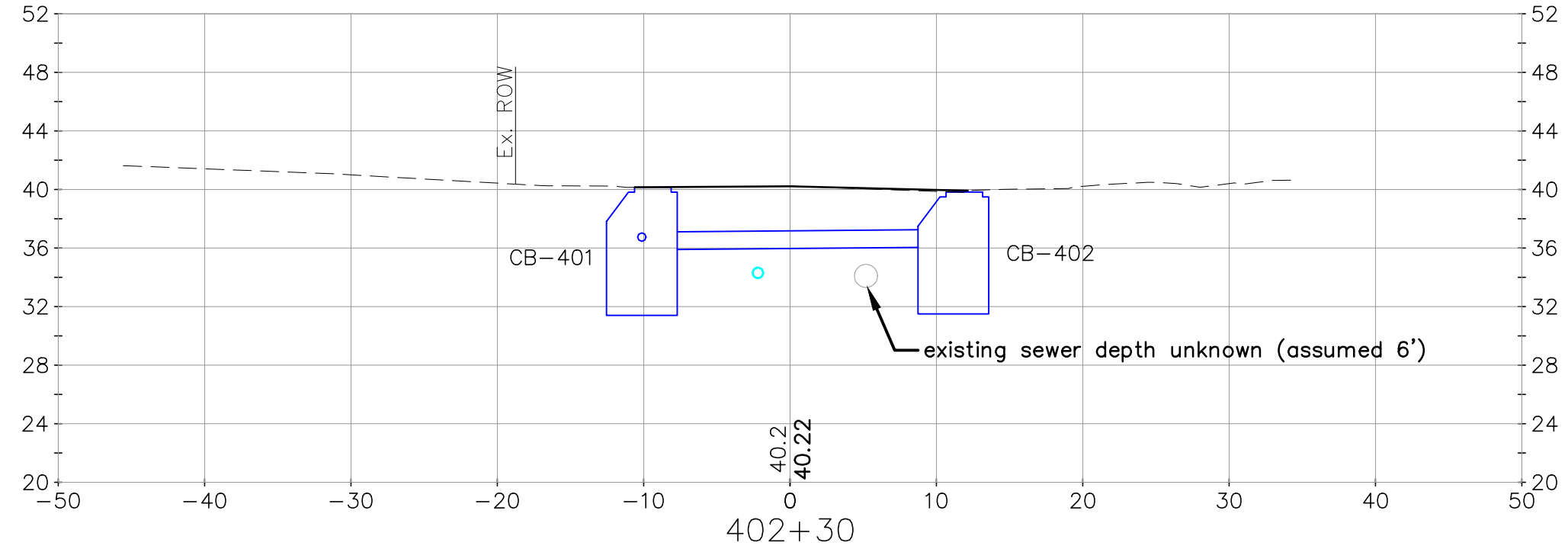
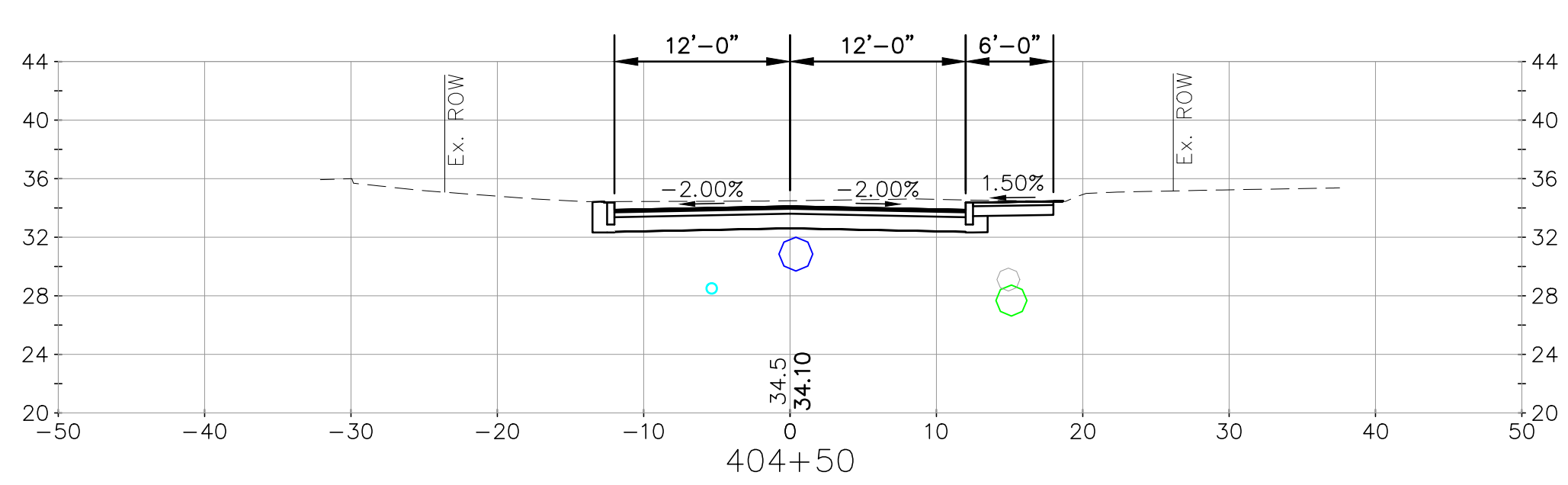
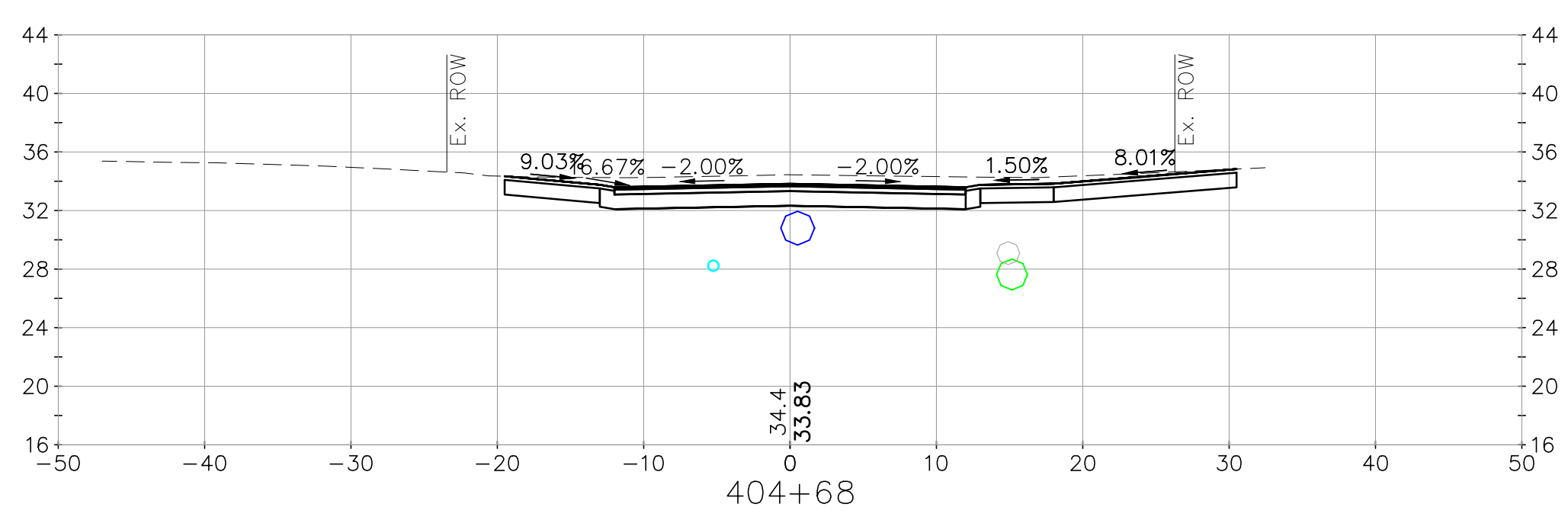
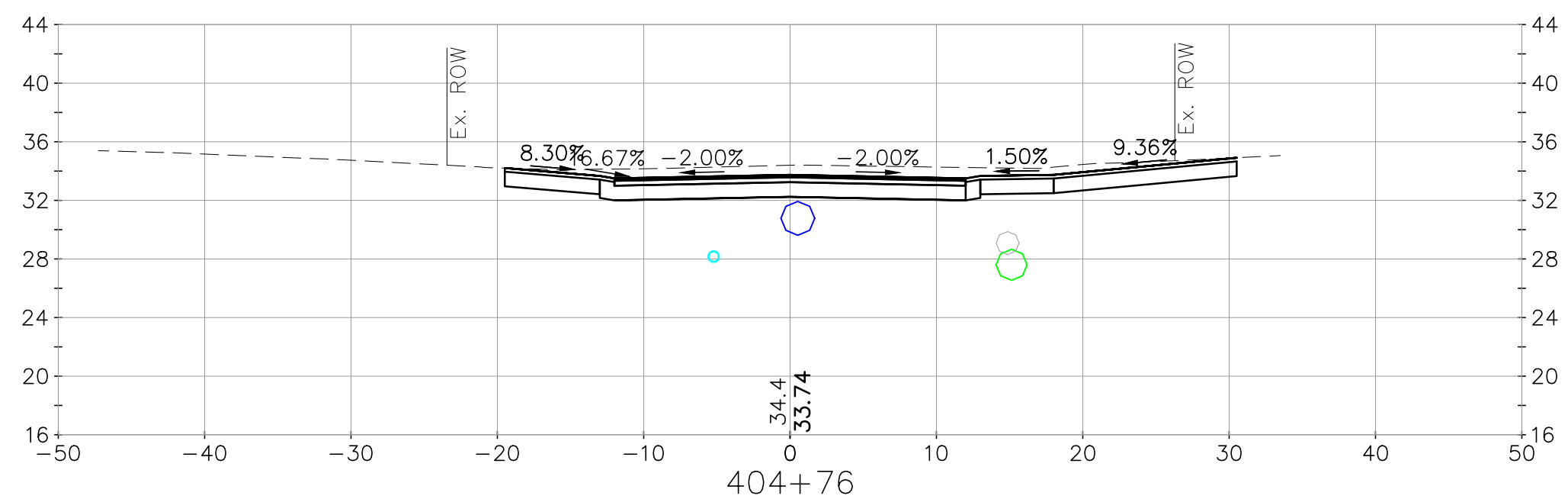
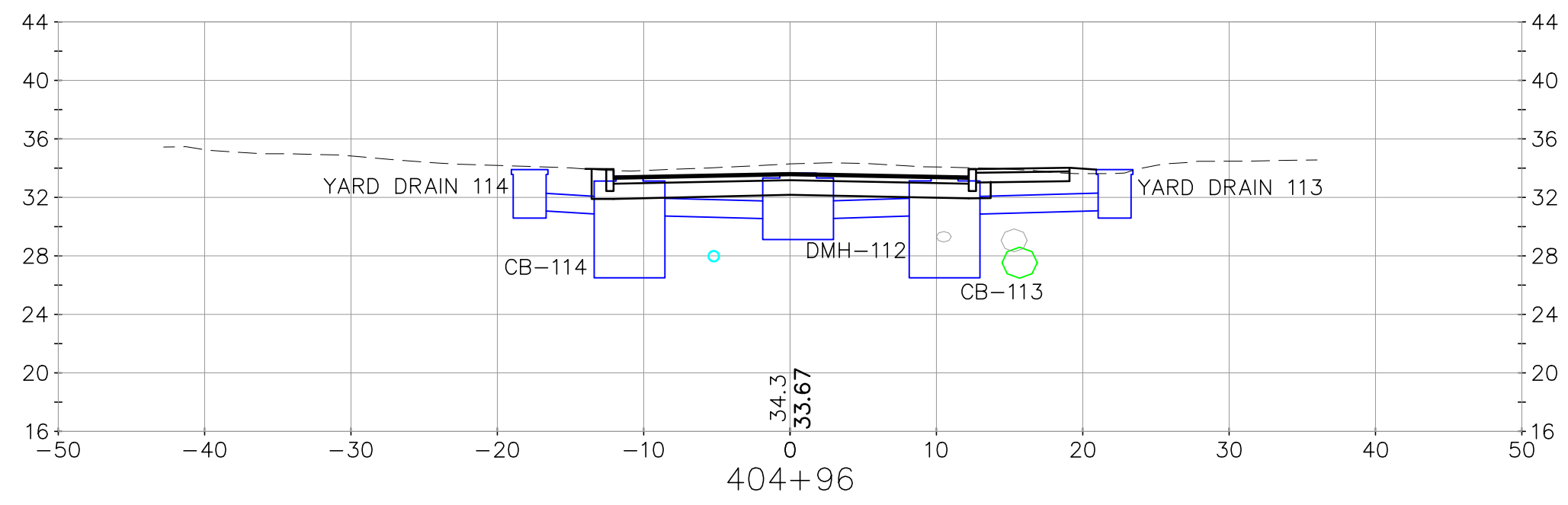


date:	February 2024	designed by:	CFC/SIF
project no.:	1211	drawn by:	WVG
checked by:	PAC	approved by:	PAC

scale: 1" = 10'  
 0 10' 20'

City of Portsmouth, New Hampshire  
 Department of Public Works  
 Willard Ave Area  
 Improvement Project  
 Cross Sections  
 Ash Street

drawing no.  
**XS-18**  
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		2/2/2024	
designed by: CFC/STF	drawn by: WVG	approved by: PAC	no.
date: February 2024	project no: 1211	checked by: PAC	revision 1
City of Portsmouth, New Hampshire Department of Public Works		Willard Ave Area Improvement Project Cross Sections Ash Street	
drawing no. XS-19		date 2/2/2024 by PAC	
sheet: 55 of 55		scale: 0 10' 20' Scale: 1" = 10'	