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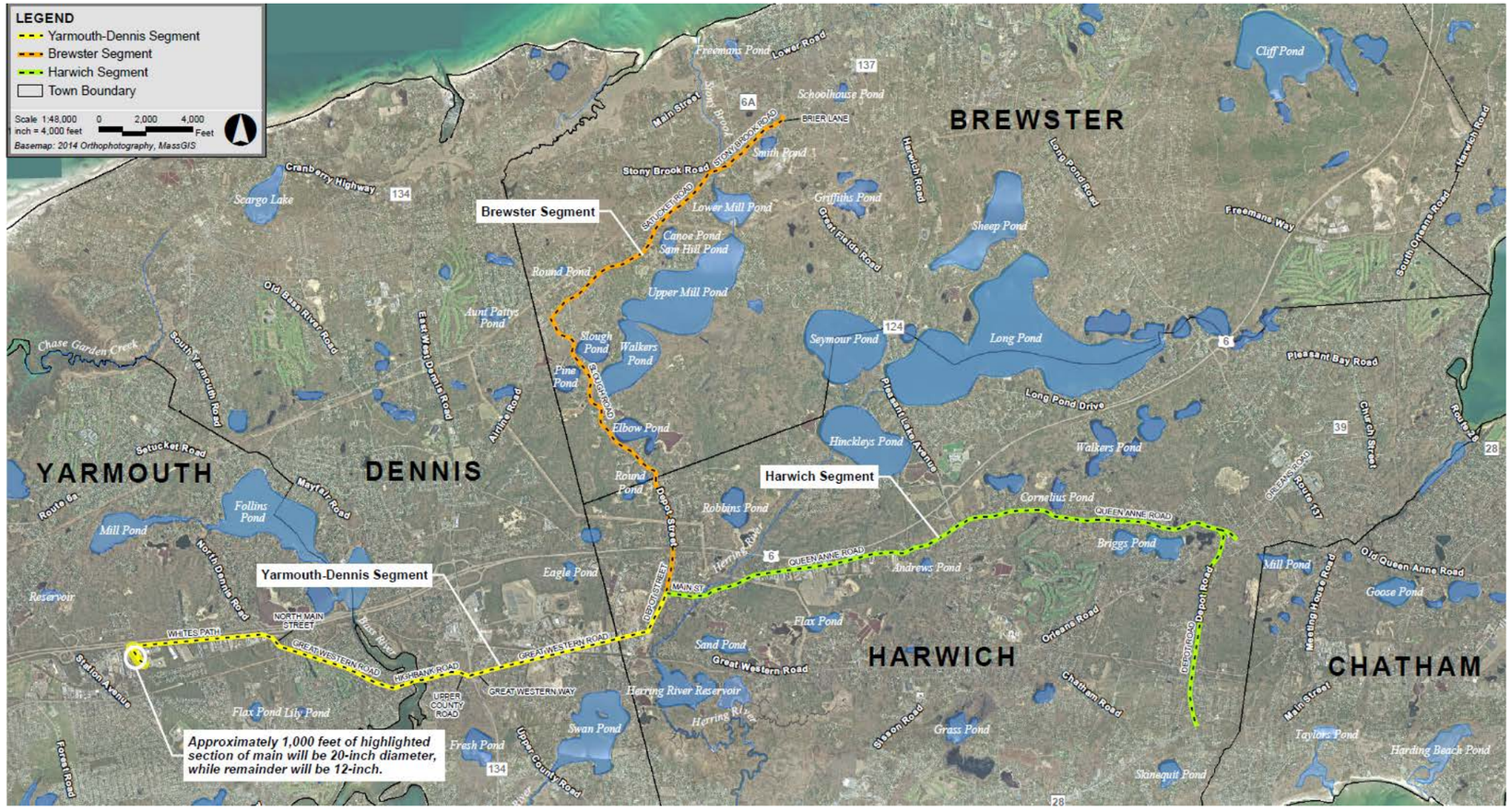
ANALYSIS TO SUPPORT PETITION BEFORE THE ENERGY FACILITIES SITING BOARD

Mid-Cape Main Replacement Project



VOLUME II – ENGINEERING PLANS

Submitted to:
Energy Facilities Siting Board
One South Station
Boston, Massachusetts 02114

Submitted by:
Colonial Gas Company d/b/a National Grid
40 Sylvan Way
Waltham, Massachusetts 02451

Prepared by:
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, Massachusetts 01754

In Association with:
CHA Consulting, Inc.
Coastal Engineering Company
Gray & Pape, Inc.
Keegan Werlin LLP

January 26, 2016

ANALYSIS TO SUPPORT PETITION BEFORE THE ENERGY FACILITIES SITING BOARD

Mid-Cape Main Replacement Project

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Submitted to:

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COLONIAL GAS COMPANY D/B/A NATIONAL GRID
40 Sylvan Road
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EPSILON ASSOCIATES, INC.
3 Clock Tower Place, Suite 250
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January 26, 2016

DRAWING NUMBER
T-001

NATIONAL GRID
MID-CAPE MAIN REPLACEMENT
PERMITTING PLANS
YARMOUTH, BREWSTER, DENNIS, HARWICH, MASSACHUSETTS

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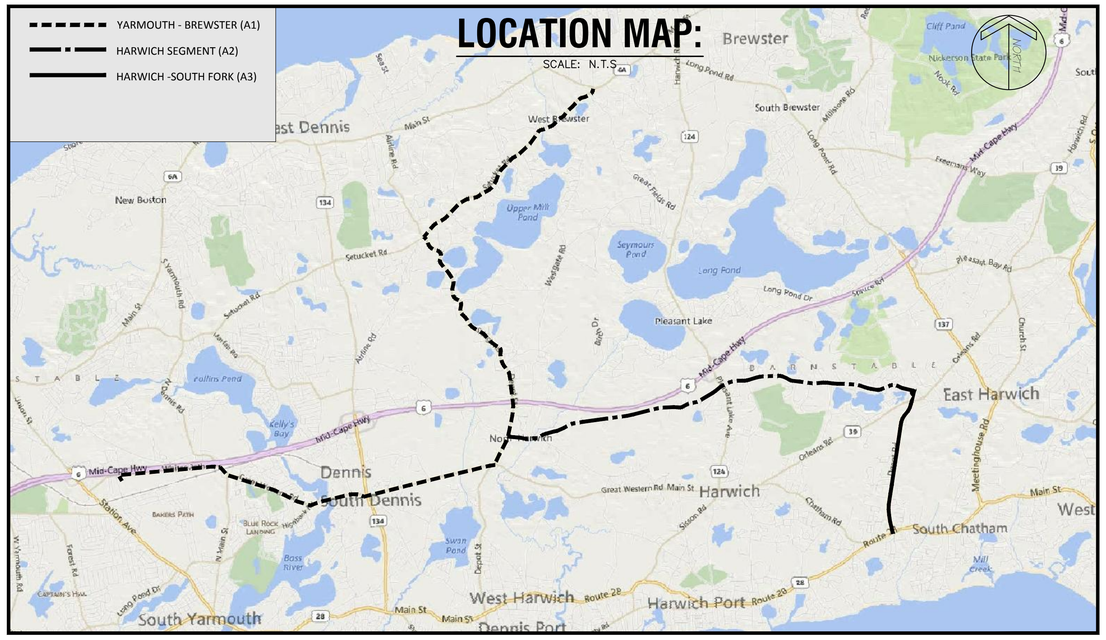
SCOPE:

THE PROJECT SCOPE INCLUDES REPLACING APPROXIMATELY 16.6 MILES OF THE COMPANY'S EXISTING 200-PSIG NATURAL GAS DISTRIBUTION MAIN SYSTEM IN THE TOWNS OF YARMOUTH, DENNIS, HARWICH, AND BREWSTER. THE NEW SYSTEM WILL BE DESIGNED AND CONSTRUCTED FOR AN MAOP OF 270 PSIG, WITH NORMAL OPERATION AT 200 PSIG.



DESIGN REMAINING:

1. BRIDGE CROSSING DESIGN UNDER REVIEW AND PENDING APPROVAL.
2. FINALIZING CONNECTION DETAILS.
3. FINALIZING VALVE LOCATIONS AND DETAILS.
4. FINALIZING PIG LAUNCHER AND RECEIVER LOCATIONS AND DETAILS.
5. FORMATTING.

CHA

CHA Project No. 29847

CONSTRUCTION PLANS
JANUARY 2016

Dig Safe System, Inc.
DIAL
811
MA – ME – NH – RI – VT

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Norwell, MA 02061
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Drawn RJT	Date 01/22/2016	Scale AS NOTED
Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
TITLE SHEET

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
T-001-29847		T-001

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\T-001-29847.DWG User: Rowsell, Geoffrey LastSavedBy: 4324
Saved: 1/22/2016 12:28:39 PM Plotted: 1/22/2016 1:44:44 PM

DRAWING NUMBER
G-001

GENERAL NOTES:

1. THE PLANS SHOW SUBSURFACE STRUCTURES, ABOVE GROUND STRUCTURES AND/OR UTILITIES FROM FIELD LOCATION AND RECORD MAPPING, EXACT LOCATION OF WHICH MAY VARY FROM THE LOCATIONS INDICATED. IN PARTICULAR, THE CONTRACTOR IS WARNED THAT THE EXACT OR EVEN APPROXIMATE LOCATION OF SUCH PIPELINES, SUBSURFACE STRUCTURES AND/OR UTILITIES IN THE AREA MAY BE DIFFERENT FROM THAT SHOWN OR MAY NOT BE SHOWN, AND IT SHALL BE HIS RESPONSIBILITY TO PROCEED WITH GREAT CARE IN EXECUTING ANY WORK.
2. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND STRUCTURES DEPICTED OR NOT DEPICTED ON THIS PLAN PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. THE CONTRACTOR SHALL CALL DIGSAFE (DIAL 811) OR 888-344-7233 AT LEAST 72 HOURS PRIOR TO CONSTRUCTION. SATURDAYS, SUNDAYS AND HOLIDAYS ARE EXCLUDED.
4. NO FIELD CHANGES SHALL BE MADE TO THIS PLAN WITHOUT APPROVAL OF ASSIGNED NATIONAL GRID PROJECT ENGINEER.
5. NOTIFY NATIONAL GRID I&R IF THE PROJECT IS WITHIN 200 FEET OF A REGULATOR STATION.
6. NEW MAINS SHALL BE INSTALLED IN ACCORDANCE WITH THE TYPICAL TRENCH DETAIL INCLUDED IN THESE DRAWINGS, UNLESS NOTED OTHERWISE.
   A. FOR SHALLOW MAIN, INSTALL STEEL PLATES PER CNST-6030 AND FOLLOW SHALLOW MAIN NOTIFICATION PROCESS D-08-19.
   B. ALL MAINS SHALL BE INSTALLED WITH A VERTICAL CLEARANCE OF NOT LESS THAN 12 INCHES FROM OTHER FACILITIES. MINIMUM HORIZONTAL CLEARANCE IS 12 INCHES. APPROPRIATE PROTECTIVE MEASURES SHALL BE USED TO PROTECT THE GAS FACILITY IF 12 INCHES CANNOT BE ATTAINED (ROCK SHIELD OR EQUIVALENT).
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACQUAINTING WITH THE CONDITIONS FOR THE SITE AND FOR ESTIMATING PROPERLY THE DIFFICULTY AND COST TO SUCCESSFULLY PERFORM THE WORK.
8. THE CONTRACTOR IS INSTRUCTED TO COOPERATE WITH ANY AND ALL OTHER CONTRACTORS PERFORMING WORK ON THIS JOB SITE DURING THE PERFORMANCE OF THIS CONTRACT.
9. THE CONTRACTOR SHALL RESTORE PAVEMENT, LAWNS, DRIVEWAYS, CULVERTS, SIGNS AND OTHER PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO AT LEAST AS GOOD A CONDITION AS BEFORE BEING DISTURBED AS DETERMINED BY THE ENGINEER. ANY DAMAGED TREES, SHRUBS, AND/OR HEDGES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. ALL GRASS AREAS DISTURBED BY CONSTRUCTION SHALL BE RESTORED WITH LOAM AND SEED.
10. RESTORATION SHALL BE IN CONFORMANCE WITH NATIONAL GRID STANDARDS AND/OR REQUIREMENTS OF LOCAL AGENCIES HAVING JURISDICTION.
11. ALL WORK SHALL BE DONE IN STRICT COMPLIANCE WITH ALL APPLICABLE NATIONAL GRID, NATIONAL, STATE, AND LOCAL CODES, STANDARDS, ORDINANCES, RULES, AND REGULATIONS.
12. NATIONAL GRID RESERVES THE RIGHT TO EXAMINE ANY WORK DONE ON THIS PROJECT AT ANY TIME TO DETERMINE THE CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS OF THIS PROJECT, AS INTENDED AND INTERPRETED BY NATIONAL GRID.
13. MISCELLANEOUS WORK NOT SPECIFICALLY SHOWN ON THE CONTRACT DRAWINGS SUCH AS PATCHING, BLOCKING, TRIMMING, ETC., SHALL BE PERFORMED AS REQUIRED TO MAKE THE WORK COMPLETE.
14. THE CONTRACTOR SHALL PROTECT EXISTING PROPERTY LINE MONUMENTATION. ANY MONUMENTATION DISTURBED OR DESTROYED, AS JUDGED BY THE ENGINEER OR OWNER, SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER THE SUPERVISION OF A COMMONWEALTH OF MASSACHUSETTS LICENSED LAND SURVEYOR.
15. ALL TRENCH EXCAVATION AND ANY REQUIRED SHEETING AND SHORING SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISIONS OF MASSACHUSETTS 520 CMR 14.00. SHEET PILING SHALL BE DESIGNED AND SEALED BY A COMMONWEALTH OF MASSACHUSETTS PROFESSIONAL ENGINEER.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING AND THE MAINTENANCE OF SURFACE DRAINAGE DURING THE COURSE OF WORK. CONTRACTOR SHALL MAINTAIN EXISTING SITE DRAINAGE PATTERNS THROUGHOUT CONSTRUCTION UNLESS OTHERWISE SHOWN ON THE PLANS.
17. MAINTAIN FLOW AND SERVICE FOR ALL EXISTING UTILITIES.
18. ALL FRAMES/COVERS WITHIN PAVED AREAS SHALL HAVE THE TOPS SET FLUSH WITH THE EXISTING PAVEMENT GRADE. IN LANDSCAPED AREAS, ALL FRAMES SHALL BE 0.1' ABOVE GRADE.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL FIELD LAYOUT. THE CONTRACTOR SHALL TAKE TIES TO ALL UTILITY CONNECTIONS AND PROVIDE MARKED-UP AS-BUILT PLANS FOR ALL UTILITIES SHOWING TIES TO CONNECTIONS, BENDS, VALVES, LENGTHS OF LINES, AND INVERTS. AS-BUILT PLANS SHOWING ALL UNDERGROUND UTILITIES INSTALLED OR ENCOUNTERED SHALL BE REVIEWED BY THE OWNER AND HIS REPRESENTATIVES. THE CONTRACTOR SHALL PROVIDE ANY CORRECTION OR ADMISSIONS TO THE SATISFACTION OF THE OWNER AND HIS REPRESENTATIVES BEFORE UTILITIES WILL BE ACCEPTED.
20. PAVEMENT PATCHING WILL CONFORM TO STREET RESTORATION STANDARDS, DTE 98-22 AND TOWN REQUIREMENTS.
21. CONTRACTOR SHALL MAINTAIN ALL TRAFFIC IN ALL AREAS IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
22. ALL NECESSARY PRECAUTIONS FOR THE SAFETY OF THE PUBLIC SHALL BE TAKEN. ALL BARRIERS, WARNING LIGHTS AND OTHER DEVICES AND EQUIPMENT REQUIRED BY FEDERAL, STATE AND LOCAL AUTHORITIES SHALL BE MAINTAINED.
23. CONTRACTOR SHALL TAKE CARE TO PREVENT DAMAGE TO EXISTING UTILITIES. DAMAGED UTILITIES SHALL BE IMMEDIATELY REPAIRED BY CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
24. A LINE MARKER UTILIZING A RED CAP SHALL BE PLACED AND MAINTAINED AS CLOSE AS PRACTICAL OVER THE PROPOSED TRANSMISSION LINE AT EACH CROSSING OF A PUBLIC ROAD AND RAILROAD AND WHEREVER NECESSARY TO REDUCE THE POSSIBILITY OF DAMAGE OR INTERFERENCE PER DAM01020 AND STANDARD DRAWING DAMG-6010.
25. 8 INCH WIDE WARNING TAPE WHICH READS "CAUTION – GAS LINE BURIED BELOW" SHALL BE PLACED ONE (1) FOOT BELOW GRADE.
26. CONTRACTOR SHALL NOTIFY NATIONAL GRID PROJECT ENGINEERING & DESIGN SHOULD THIS PROJECT EXCEED THE TABLES SET FORTH IN NATIONAL GRID DOCUMENTS CNST04004 AND PURG5010-MA-NH.
27. CONTRACTOR RESPONSIBLE FOR COMPLETING ANY SUBSURFACE INVESTIGATIONS AS DEEMED NECESSARY TO VERIFY CONSTRUCTABILITY PRIOR TO CONSTRUCTION OR SUBMITTAL OF SHOP DRAWINGS.
28. DISCHARGE FROM DEWATERING SYSTEMS AND ANY REQUIRED PERMITTING TO BE COORDINATED THROUGH NATIONAL GRID.

CODES, SPECS, PROCEDURES & CERTIFICATION:

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST VERSION OF NATIONAL GRID STANDARDS & POLICY, MATERIAL STANDARDS AND SPECIFICATIONS AND TECHNICAL COMMUNICATIONS.
2. ALL WORK SHALL CONFORM TO ALL LOCAL, STATE AND FEDERAL CODES. WHERE ANY CONFLICTS OF CODES, STANDARDS AND REGULATIONS MAY EXIST, THE MORE STRINGENT CODE, STANDARD OR REGULATION SHALL APPLY.
3. ALL DESIGN AND CONSTRUCTION PRACTICES SHALL ADHERE TO 49 CFR 192, 220 CMR 109, 220 CMR 101 AND ALL MASSACHUSETTS STATE CODES AT A MINIMUM.
4. ALL PIPING MATERIAL TO BE USED FOR ANY RECONFIGURATION SHALL BE IN ACCORDANCE WITH NATIONAL GRID MATERIAL SPECIFICATIONS.
5. WORK SHALL BE PERFORMED IN ACCORDANCE WITH NATIONAL GRID GAS POLICIES AND WORK METHODS, INCLUDING BUT NOT LIMITED TO:
   A. GEN01009: REPORTING NONCONFORMING MATERIAL
   B. GEN01015: REQUIREMENTS FOR ESTABLISHING AND RETAINING PROJECT FILES FOR ALL PIPING 125 PSIG AND GREATER
   C. GEN01100: OPERATOR QUALIFICATION PLAN
   D. GEN03002: PROCESSING GAS MAIN AND NEW SERVICE WORK PACKAGES
   E. GEN03003: CHANGE CONTROL PROCEDURE FOR CONSTRUCTION PROJECTS.
   F. GCON02001: SYSTEM OPERATING PROCEDURE (SOP)
   G. CNST01003: BACKFILL AND RESTORATION
   H. CNST01005: PREPARATION OF GAS FACILITY HISTORICAL RECORDS
   I. CNST01006: COMMERCIALLY AVAILABLE SHORING SYSTEMS
   J. CNST04002-MA: PIPELINE HYDROSTATIC TESTING
   K. CNST04004: PRESSURE TESTING MAINS OPERATING AT 125 PSIG OR GREATER
   L. CNST04006: INSTALLING TRANSMISSION LINES AND PIPELINES OPERATING AT 125 PSIG OR GREATER
   M. CNST04007: FIELD COLD BENDING OF LINE PIPE
   N. CNST04011: ABANDONMENT OF MAINS
   O. CNST05002: WELDING POLICY
   P. CNST05003: WELDING SAFETY
   Q. CNST5010: GENERAL CONSTRUCTION REQUIREMENTS AND PIPE HANDLING
   R. CNST04006: INSTALLING TRANSMISSION LINES AND PIPELINES OPERATING AT 125 PSIG OR GREATER
   S. INR06002: SUPPLEMENTAL ODORIZATION FOR NEW PIPING
      i. NOTIFY I&R FOR PROJECTS IN EXCESS OF 2500 FEET. ODOR MONITORING AND/OR SUPPLEMENTAL ODORIZATION MAY BE REQUIRED.
   K. PURG5010: PURGE AND GAS-IN OF MAINS AND SERVICE LINES
      i. PROJECTS GREATER THAN 12-INCHES IN DIAMETER AND OR GREATER THAN 4,000 FEET IN LENGTH REQUIRE A WRITTEN PURGE PROCEDURE.
      ii. BOTTLES OF NITROGEN REQUIRED: 245.
6. DESIGN IN ACCORDANCE WITH THE FOLLOWING:
   A. ENG02001: DESIGN OF GAS SERVICES.
   B. ENG03001: DESIGN OF TRANSMISSION LINES AND PIPELINES WITH MAOP'S OF 125 PSIG OR GREATER.
   C. ENG04010: DESIGN REQUIREMENTS FOR INSTALLATION OF CASINGS.
   D. ENG04030: DESIGN REQUIREMENTS FOR INSTALLATION OF GAS MAIN ON BRIDGES.
7. SEE BILL OF MATERIAL FOR MATERIAL SPECIFICATION & REFERENCES.

SCOPE OF WORK:

NATIONAL GRID WORK ORDER NO. GAS 429

1. INSTALL 114,500' +/- OF 12-INCH CARBON STEEL MAIN IN THE TOWNS OF YARMOUTH, DENNIS, HARWICH, AND BREWSTER MASSACHUSETTS.
2. THE CONTRACTOR SHALL FURNISH ALL NECESSARY LABOR, MATERIALS, EQUIPMENT AND SERVICES TO COMPLETE THE PAINTING OF ALL NON-BURIED CARBON STEEL PIPING COMPONENTS (I.E. FLANGES, VALVES, FLANGE BOLTING MATERIAL, PIPING SUPPORTS AND ALL MISCELLANEOUS METAL) INSTALLED BY THE CONTRACTOR.

DESIGN CRITERIA:

DESIGN CLASS LOCATION: 4
LENGTH – 88,640 FEET (16.79 MILES)
NOMINAL SIZE – 12 INCH AND 20 INCH
MATERIAL –CARBON STEEL
WALL THICKNESS – 0.375"
PIPE GRADE – API 5L PSL2
OPERATING PRESSURE – 200 PSIG
MAOP – 270 PSIG
HOOP STRESS AT 270 PSIG (% SMYS): 12"(X42): 10.93%, 20"(X52): 13.85%
HOOP STRESS AT 200 PSIG (% SMYS): 12"(X42): 8.10%, 20"(X52): 10.26%

WELDING:

1. NATIONAL GRID WELDING POLICIES AND PROCEDURES INCLUDE:
   A. CNST05002: WELDING POLICY
   B. CNST05003: PIPE WELDING SAFETY
   C. MS-030: WELDING FILLER MATERIALS
2. PRIOR TO THE START OF ANY WORK THE CONTRACTOR SHALL SUBMIT WELDER CERTIFICATION DOCUMENTS FOR EACH OF THE WELDERS EMPLOYED ON THIS PROJECT.
3. ALL WELDED MATERIALS SHALL BE FURNISHED WITH A CERTIFIED MATERIAL TEST REPORT (CMTR).
4. ALL WELDING SHALL BE WITNESSED AND INSPECTED BY A CERTIFIED WELDING INSPECTOR (CWI). THE PERSON PERFORMING THE WELDING SHALL NOT INSPECT THEIR OWN WELDS.
5. TRANSMISSION PROJECTS WITH PIPE DESIGNED TO OPERATE WITH A MAOP OF 125 PSIG OR GREATER SHALL HAVE 100% OF WELDS SUBJECT TO NON-DESTRUCTIVE EXAMINATION (NDE).
   A. RADIOGRAPH: 100%(MINIMUM) OF BUTT WELDS 2-INCH AND GREATER.
   B. MAGNETIC PARTICLE OR LIQUID PENETRANT: 100% OF ALL WELDS LESS THAN 2-INCH NPS.
6. NDE, WELD MAP, CWI & GPS SHALL BE PROVIDED BY APPLUS RTD, AS NECESSARY.
7. APPLUS RTD SCHEDULING CONTACT:
   JODY BAUDANZA
   CELL: (603) 305-0496
   EMAIL: JODY.BAUDANZA@APPLUSRTD.COM

CATHODIC PROTECTION:

1. IF EXISTING TEST STATIONS, WIRES, AND/OR MAGNESIUM ANODES ARE DISTURBED OR DAMAGED, NOTIFY THE NATIONAL GRID CORROSION DEPARTMENT:
   DON DOUBLEDAY 978-815-8903
   BUTCH VINCENT 617-438-5192
   ASAD AKINFOLARIN 401-215-5678
   (OFFICE/GENERAL) 978-322-3637
2. STEEL PIPE, FITTINGS, VALVES AND OTHER CARBON STEEL COMPONENTS TO BE BURIED WHICH ARE NOT FACTORY COATED FOR BURIED SERVICE SHALL BE FIELD COATED.
3. NATIONAL GRID CORROSION POLICIES AND PROCEDURES INCLUDE:
   A. 030024-CS: INSTALLATION OF MAGNESIUM ANODES
   B. 030026-CS: INSTALLATION OF TEST STATIONS FOR CATHODIC PROTECTION
   C. 030031-CS: FACILITY COATING GUIDE
   D. COR01100: CORROSION DESIGN CRITERIA
   E. COR02001: APPLICATION OF COATING SYSTEMS
   F. COR02010: INSPECTING EXPOSED STEEL PIPE FOR CORROSION
   G. COR03001: TESTING OF PIPE COATING (JEEP TESTING)
   H. COR04001: INSTALLATION OF MAGNESIUM ANODES
   I. COR04002: INSTALLATION OF IMPRESSED CURRENT ANODES AND RECTIFIERS
   J. COR04003: INSTALLATION OF TEST STATIONS FOR CATHODIC PROTECTION
   K. COR04004: INSTALLATION OF WIRE CONNECTIONS
   L. COR04005: INSTALLATION OF INSULATING JOINTS FOR CATHODIC PROTECTION
4. CORROSION DESIGN: DETAILS BY NGRID.

ENVIRONMENTAL:

1. WORK SHALL CONFORM TO THE NATIONAL GRID ENVIRONMENTAL POLICY.
2. ENVIRONMENTAL ENGINEERING CONTACT:
   DEBORAH BLANCH
   PHONE: (508)897-5520
   EMAIL: DEBORAH.BLANCH@NATIONALGRID.COM
3. CONTRACTOR SHALL REVIEW THE PROJECT WORK ORDER PACKAGE FOR ENVIRONMENTAL GUIDANCE FORMS.
4. PERSONNEL SHALL AVOID WORKING IN AREAS CONTAINING CONTAMINATED SOIL, UNKNOWN OR HAZARDOUS MATERIALS (ASBESTOS), UNLESS THEY ARE TRAINED, QUALIFIED, AND APPROVED TO DO SO. PERSONNEL WHO SUSPECT OR ENCOUNTER CONTAMINATED SOIL OR HAZARDOUS MATERIALS SHALL NOTIFY THEIR SUPERVISORS AND/OR THE DIVISION ENVIRONMENTAL ENGINEER FOR GUIDANCE.
5. CONTAMINATED SOIL SHALL NOT BE TRANSPORTED UNLESS APPROVED BY THE DIVISION ENVIRONMENTAL ENGINEER.
6. NATIONAL GRID ENVIRONMENT POLICIES AND PROCEDURES INCLUDE:
   A. ENVR5043: ENCOUNTERING SOIL OR LIQUIDS SUSPECTED OF CONTAINING OIL AND/OR HAZARDOUS MATERIALS DURING EXCAVATIONS
   B. SHE02001: HANDLING CONTAMINATED MATERIALS AND PIPING
7. ENVIRONMENTAL REQUIREMENTS: DETAIL BY NGRID.
8. TURTLE SWEEPS ARE REQUIRED IN NHESP PRIORITY HABITAT WORK AREAS OF THE PROJECT. SEE THE SWPPP FOR MORE INFORMATION.

SAFETY:

1. WORK SHALL CONFORM TO THE NATIONAL GRID EMPLOYEE SAFETY HANDBOOK, OSHA REQUIREMENTS, AND ALL LOCAL, STATE AND FEDERAL CODES. WHERE ANY CONFLICTS OF CODES, STANDARDS AND REGULATIONS MAY EXIST, THE MORE STRINGENT CODE, STANDARD OR REGULATION SHALL APPLY.
2. NATIONAL GRID SAFETY CONTACT:
   PATRICIA BRENNAN
   PHONE: (774) 262-3052
   E-MAIL: PATRICIA.BRENNAN@NATIONALGRID.COM
3. REQUIRED PPE SHALL BE WORN AND UTILIZED IN ACCORDANCE WITH THE CURRENT NATIONAL GRID SAFETY POLICY.
4. A NATIONAL GRID APPROVED CONTRACTOR HEALTH AND SAFETY PLAN (HASP) IS REQUIRED PRIOR TO CONSTRUCTION.
5. JOB BRIEFINGS, AT A MINIMUM, SHALL BE CONDUCTED BEFORE THE START OF THE FIRST JOB ON EACH DAY OR SHIFT. ADDITIONAL BRIEFINGS MAY BE REQUIRED AFTER EXTENDED WORK BREAKS.
6. CONSTRUCTION SIGNING, DRUMS, BARRICADES, AND OTHER DEVICES SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) PART VI AND SHALL BE MAINTAINED BY THE CONTRACTOR.
7. NATIONAL GRID SAFETY POLICIES AND PROCEDURES INCLUDE:
   A. SHE01001: GENERAL SAFETY REQUIREMENTS
   B. SHE01002: SUPPLIED-AIR RESPIRATORS
   C. SHE01003: USING AND MAINTAINING PORTABLE GAS MONITORS
   D. SHE01004: USING AND MAINTAINING FLAME IONIZATION UNITS
   E. SHE01005: DISSIPATING STATIC ELECTRICAL CHARGES ON PLASTIC PIPE
   F. SHE01010: THE APPLICATION OF FORMAL PROCESS SAFETY ASSESSMENTS TO HIGHER-RISK GAS ACTIVITIES PERFORMED IN THE FIELD
   G. J-1002: INCIDENT REPORTING
   H. M-1301: STANDARDS FOR WORKING IN EXCAVATIONS
   I. N-1402: CONTRACTOR SAFETY REQUIREMENTS
   J. Q-1702: WORK ZONE TRAFFIC CONTROL

OTHER PERMITTING REQUIREMENTS:

1. ROADWAY RESTORATION SHALL CONFORM TO THE REQUIREMENTS OF THE TOWN.
2. ALL WORK SHALL BE LIMITED TO THE EXISTING RIGHT-OF-WAYS, UNLESS OTHERWISE NOTED.
3. WORK SHALL CONFORM TO THE NATIONAL GRID BACKFILL AND RESTORATION STANDARD CNST01003 AND RESTORED IN ACCORDANCE WITH DTE CODE 98-22.
4. THE LIMIT OF WORK SHOWN ON THE PLANS IS CONTINGENT TO THE CENTERLINE OF ROAD TO THE MASSDOT ROW FENCE UNLESS OTHERWISE DICTATED BY THE TOWN TREE WARDEN OR DETAILED WITHIN THE PROJECT TRAFFIC MANAGEMENT PLANS.

UTILITY OWNER INFORMATION:

YARMOUTH

ELECTRIC: NSTAR
GAS: NATIONAL GRID
TELEPHONE: VERIZON
WATER: YARMOUTH WATER DEPT.
SEWER: NONE
RAILROAD: MASS COASTAL RR
CABLE: COMCAST

DENNIS

ELECTRIC: NSTAR
GAS: NATIONAL GRID
TELEPHONE: VERIZON
WATER: DENNIS WATER DISTRICT
SEWER: NONE
RAILROAD: MASS COASTAL RR
CABLE: COMCAST

HARWICH

ELECTRIC: NSTAR
GAS: NATIONAL GRID
TELEPHONE: VERIZON
WATER: HARWICH WATER DEPT.
SEWER: NONE
CABLE: COMCAST

BREWSTER

ELECTRIC: NSTAR
GAS: NATIONAL GRID
TELEPHONE: VERIZON
WATER: BREWSTER WATER DEPT.
SEWER: NONE
CABLE: COMCAST

ENGINEER CONTACT INFORMATION:

NATIONAL GRID:
MICHAEL CHIN
SENIOR ENGINEER – GAS PROJECT ENGINEERING
781-907-2835
MICHAEL.CHIN@NATIONALGRID.COM

CHA CONSULTING, INC.:
JEFFREY O'DONNELL, P.E.
MARKET SEGMENT DIRECTOR – GAS DELIVERY
781-982-5456
JODONNELL@CHACOMPANIES.COM

PRESSURE TEST REQUIREMENTS:

1. PRESSURE TEST MAIN IN ACCORDANCE WITH CNST04004 (125 PSIG OR GREATER).
   A. TEST PRESSURE (MINIMUM): 405 PSIG
   B. TEST DURATION (MINIMUM): 8 HOUR(S)
   C. TEST MEDIUM: WATER
2. PRESSURE TEST TO BE COMPLETED AS HYDROSTATIC IN ACCORDANCE WITH CHST04002-MA AND CNST04004

SURVEY NOTES:

1. THE EXISTING CONDITIONS INFORMATION SHOWN HEREON IS THE RESULT OF AN ON-THE-GROUND SURVEY PERFORMED BY CHA CONSULTING, INC. BETWEEN MARCH 3, 2015 AND APRIL 17, 2015.
2. THE HORIZONTAL DATUM IS THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83). RIMS, ELEVATIONS, AND BENCHMARKS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD 88). TEMPORARY BENCHMARKS, REFERENCED TO THE DATUM ARE INDICATED ON THE SURVEY.

   IN THE EVENT THAT BENCHMARKS (TBM'S), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.
3. RIGHT-OF-WAY INFORMATION AND BUILDINGS ARE DIGITALLY COMPILED FROM MASS G.I.S. INFORMATION AND ASSESSORS MAPS.
4. LOCATION OF SUBSURFACE UTILITIES SHOWN HEREON ARE APPROXIMATE AND ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. LOCATIONS ARE COMPILED FROM UTILITY PLANS OF RECORD, FIELD OBSERVATIONS AND FIELD MARKINGS. RIM AND INVERT INFORMATION HAS BEEN COMPILED AND FIELD VERIFIED WHERE POSSIBLE. THIS INFORMATION IS NOT TO BE USED FOR CONSTRUCTION. PRIOR TO ANY CONSTRUCTION, CONTACT DIG-SAFE (1-800-344-7233) TO FIELD VERIFY LOCATION OF ALL UTILITIES.

REFERENCE DRAWINGS:

1. PLAN ENTITLED "EASTERN CAPE COD TRANSMISSION PIPELINE REPLACEMENT – EXISTING CONDITIONS," PREPARED BY CHA CONSULTING, INC., DATED JUNE 2014, SCALE 1"=40'.

LEGEND

- A1 21+00 – PROPOSED GAS LINE
- PROPOSED GAS VALVE
- PROPOSED CP TEST STATION AND LEADS
- X C-601 X C-601 – DETAIL CALLOUT
- STREET BOUNDARY
- G – GAS LINE
- W – WATERLINE
- S – SEWER LINE
- D – DRAIN LINE
- 7 – OVERHEAD ELECTRIC LINE
- WETLAND BOUNDARY
- WETLAND BUFFER (50')
- WETLAND BUFFER (100')
- RIVER BOUNDARY
- TOP OF BANK
- BOUND – BOUND
- ELEC HH – ELECTRIC HANDHOLE
- MHE – ELECTRIC MANHOLE
- CAMH – COMM/CATV MANHOLE
- TRAF HH – TRAFFIC SIGNAL HANDHOLE
- MH – SEWER MANHOLE
- SIGN
- MBX – MAILBOX
- TSLOH – TRAFFIC SIGNAL LIGHT OVERHEAD
- 2 – MATERIAL CALLOUT
- MHW – WATER MANHOLE
- WATER HH – WATER HANDHOLE
- WATER MTR – WATER METER
- WATER SHUTOFF
- WV – WATER VALVE
- HYD – HYDRANT
- CB – CATCH BASIN
- DMH – DRAIN MANHOLE
- SIGNAL POLE – SIGNAL POLE
- GUY POLE – GUY POLE
- LIGHT – LIGHT POLE
- TREE – DECIDUOUS TREE
- GV – GAS VALVE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Drawn RJT | Date 01/22/2016 | Scale AS NOTED
Chkd. BCK | Design Engr. GEW | Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

CAD FILE NAME: G-001 GENERAL NOTES AND LEGEND
SEQUENCE No.: GENERAL NOTES AND LEGEND
DRAWING NUMBER: G-001

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\G-001 GENERAL NOTES AND LEGEND.DWG
Saved: 1/22/2016 1:15:53 PM Plotted: 1/22/2016 1:45:04 PM User: Rowsell, Geoffrey LastSavedBy: 4324

DRAWING NUMBER G-002

DRAWING INDEX

General Series

Sheet Number	Sheet Title
T-001	TITLE SHEET
G-001	GENERAL NOTES AND LEGEND
G-002	INDEX
G-003	GENERAL DETAIL SHEET
G-004	GENERAL DETAIL SHEET
G-005	GENERAL DETAIL SHEET
G-006 NOT INCLUDED IN THIS SET	GENERAL DETAIL SHEET
G-007	GENERAL DETAIL SHEET
G-008	BILL OF MATERIALS
G-009	BILL OF MATERIALS
G-010	BILL OF MATERIALS
M-001	BRIDGE PLAN AND PHOTOS
M-002	BRIDGE SECTION, ELEVATION, PLAN & 3D MODEL
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F-001 NOT INCLUDED IN THIS SET	FLOW DIAGRAM-LNG PLANT
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F-007 NOT INCLUDED IN THIS SET	FLOW DIAGRAM-ROUTE 28 AT DEPOT
F-008 NOT INCLUDED IN THIS SET	PIGGING DIAGRAM-WHITES PATH
F-009 NOT INCLUDED IN THIS SET	PIGGING DIAGRAM- DEPOT AT MAIN
F-010 NOT INCLUDED IN THIS SET	PAGE INTENTIONALLY LEFT BLANK

Alignment A1

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Alignment A2

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C-263	NOT INCLUDED IN THIS SET

Alignment A3

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Dig Safe System, Inc.
DIAL
811
MA – ME – NH – RI – VT

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
INDEX

CAD FILE NAME: G-002-29847
SEQUENCE No.:
DRAWING NUMBER: G-002

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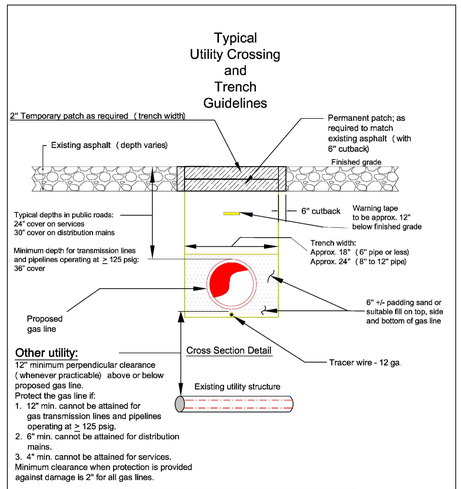
Saved: 1/22/2016 12:08:42 PM Plotted: 1/22/2016 1:45:23 PM User: Rowsell, Geoffrey LastSavedBy: 4324

DRAWING NUMBER G-003



DETAIL 1
SCALE N.T.S.

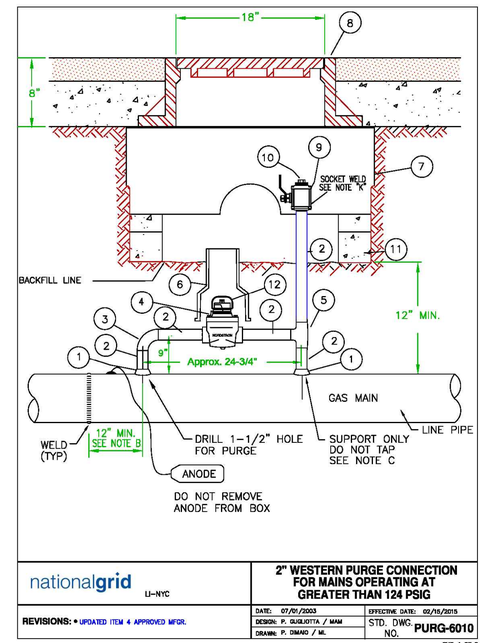
TYPICAL UTILITY CROSSING AND TRENCH INSTALLATION DETAIL

PERIMETER CONTROLS:

1. PERIMETER CONTROLS ARE TO BE INSTALLED ON DOWNSLOPE SIDE OF AREAS OF DISTURBANCE WHERE THERE IS POTENTIAL FOR SEDIMENT RUNOFF AND/OR SOIL EROSION.
2. PERIMETER CONTROLS ARE NOT TO CROSS ACTIVE ACCESS ROUTES (E.G., ROADS) OR ACTIVE FLOW PATHS (E.G., A STREAM).
3. PARTICULAR CARE IS TO BE TAKEN WHEN INSTALLING PERIMETER CONTROLS IN A WETLAND.
4. WITHIN AT LEAST 50 FEET OF WATER RESOURCE AREAS, PERIMETER CONTROLS MUST INCLUDE:
   a. REINFORCED SILT FENCE – TO BE REINFORCED WITH WIRE MESH, STAKED HAYBALES, STAKED FIBER ROLLS, EROSION CONTROL MIX BERMS, OR WOOD CHIP BERMS.
   b. STONE BERMS
   c. OTHER INTERCHANGEABLE AND/OR MA DEP–APPROVED MEASURE.
5. GREATER THAN AT LEAST 50 FEET FROM WATER RESOURCE AREAS, PERIMETER CONTROLS MAY INCLUDE:
   a. SILT FENCE (NON–REINFORCED)
   b. STAKED FIBER ROLLS
   c. EROSION CONTROL MIX BERMS
   d. OTHER INTERCHANGEABLE AND/OR MA DEP–APPROVED MEASURE.

DETAIL 1A
SCALE N.T.S.

PERIMETER CONTROL TABLE



NOTES:

A. THIS CONSTRUCTION STANDARD SHALL BE USED WHEN INSTALLING PURGES ON TRANSMISSION MAINS RANGING IN SIZES 6 INCHES THROUGH 30 INCHES
B. PURGES ARE NORMALLY INSTALLED ON EACH SIDE OF A TRANSMISSION VALVE AND SHOULD BE WELDED NO CLOSER THAN 12 INCHES OR ONE PIPE DIAMETER FROM THE NEAREST PIPELINE WELD, WHICHEVER IS GREATER.
C. DO NOT TAP THE MAIN AT THE SUPPORT CONNECTION.
D. ALL BACKFILL AROUND THE PURGE PIPE SHALL BE THOROUGHLY HAND TAMPED FOR ADDED RIGIDITY.
E. ALL BARE PIPE AS WELL AS DAMAGED COATING ON PRECOATED PIPE AND FITTINGS, EXPOSED OR INSTALLED IN THE EXCAVATION SHALL BE FIELD WRAPPED IN ACCORDANCE WITH LATEST CORROSION SPECIFICATIONS.
F. A HOLE IS TO BE DRILLED THROUGH THE STEEL GAS MAIN BEFORE ATTACHING THE WELDOLET (ITEM 1).
G. SPECIFICATIONS FOR PURGES TO BE INSTALLED ON MAINS GREATER THAN 30 INCHES IN SIZE SHALL BE DETERMINED BY GAS PROJECT ENGINEERING AND INCLUDED IN ALL APPLICABLE WORK ORDERS.
H. ALL WELDING TO CONFORM TO APPLICABLE STANDARDS.
I. USE ONLY THE LOWER HALF OF THE VALVE BOX VALVE SHOE TO PROTECT THE VALVE IN THE PIT.
J. MAINTAIN 12" MINIMUM CLEARANCE BETWEEN CONCRETE MANHOLE PIT MAIN.
K. THIS 2" BALL VALVE IS SOCKET WELD X THREADED. THIS VALVE MUST BE TAKEN APART PRIOR TO WELDING TO AVOID HEAT DAMAGE TO THE SEATS. AFTER WELDING, THEN RE-ASSEMBLE.
L. IF FIELD CONDITIONS PROHIBIT ACCESS INTO VALVE BOX SECTION TO INSTALL ITEM 13 LOCKING DEVICE LISTED, USE GOODMAN EXPANDABLE TYPE SOLID RUBBER CURB BOX PLUG FROM MULCARE TO FIT 4.4 INCH I.D. VALVE BOX SECTION (ITEM 6) AS THE LOCKING DEVICE.

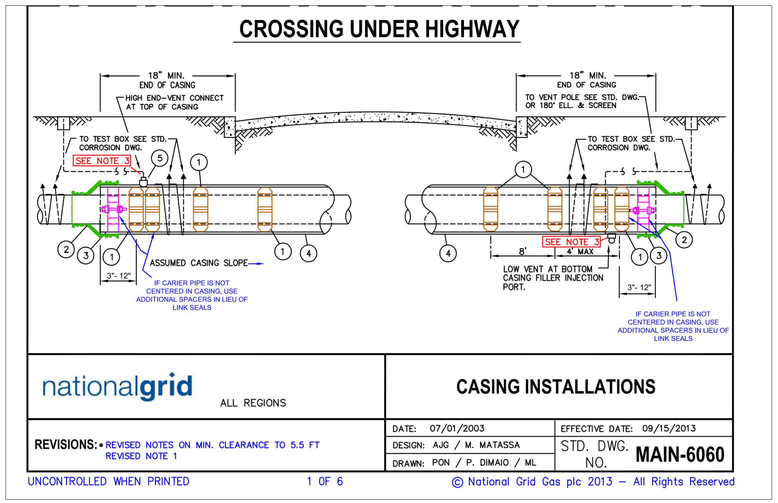
No.	ITEM	SAP ITEMS	ORACLE ITEMS
12	LOCKING DEVICE, KEROTEST WELD CAP TYPE: FITS 2"X2" SQUARE OPERATING NUTS WITH BUTTON HEAD LUBRICATING FITTING, OR KEROTEST THREADED SHANK, OR PLAIN 2"X2" OPERATOR. SECURE WITH HIGHFIELD OR INNERTITE LOCK. (SEE NOTE L)	9385368	00136536
11	CEMENT BLOCK 8" X 8" X 18"	NON STOCK	NON STOCK
10	PLUG 2" SOLID STEEL WITH SQUARE HEAD – 3000#	9342572	00352065
9	VALVE, 2" BALL SOCKET WELD X THREADED END – KF VALVES MODEL 2 7453-07-Y90-M2	9385390	00362201
8	18" FRAME AND COVER FRAME / COVER	9330759 / 9330658	00131029 / 00131001
7	PRECAST PIT 18" ROUND	9330821	00131051
6	#445 SIDEWALK VALVE BOX - LOWER SECTION ONLY	9339889	00308055
5	TEE, 2" WELD SCH 80	9342464	00371198
4	VALVE, 2" WELD END, 300# NORD. FIG. 2025 ½, BEVELED FOR 0.218 WALL SCH. 80 PIPE	9386352	00362254
3	BEND 2" WELD 90 SCH 80	9341221	00320265
2	PIPE – 2" SCH 80 UNCOATED	9340859	00350200
1	WELD-O-LET, – 2" SCH 80 (EXTRA – STRONG) 6" PIPE / 12"-18" PIPE / 20" – 36" PIPE	– / 9320040 / 9381596 / 9381887	– / 00372073 / 00372072 / 00372071

BILL OF MATERIAL

SHT. 2 OF 2 PURG-6010

DETAIL 2
SCALE N.T.S.

WESTERN PURGE DETAIL (ITEM NO. XX)



BILL OF MATERIAL*

SUPPLIER	ITEM	DESCRIPTION	SIZE	QTY
NATIONAL GRID	1	INSULATING SPACER #9341031	XX"	XX ±
NATIONALGRID	2	END SEAL #9342440	XX"	X
NATIONALGRID	3	LINK, SEAL, ASSY. MODEL LS-400-C #9339728	XX"	X
NATIONALGRID	4	CASING WRAPPED STEEL #9340800	XX"	XXX ±
NATIONALGRID	5	THREAD-O-LET #9342054	2"	X

*THIS BOM DOES NOT INCLUDE MATERIALS FOR BASS RIVER BRIDGE CROSSING CASINGS. PLEASE REFER TO SHEET M-003 FOR MORE INFORMATION

DETAIL 3
SCALE N.T.S.

CASING DETAILS
(ITEM NO. XX)

No	Date	Revision	By	Chkd.	Engr.	Supv.
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Drawn RJT | Date 01/22/2016 | Scale AS NOTED
Chkd. BCK | Design Engr. GEW | Design Supv. JEO

NATIONAL GRID GAS
MID–CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
GENERAL DETAILS

CAD FILE NAME: DETAIL SHEETS | SEQUENCE No. | DRAWING NUMBER G–003

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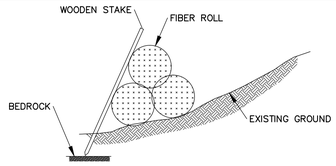
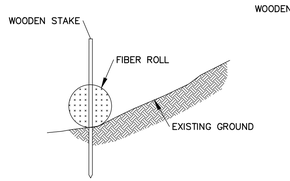
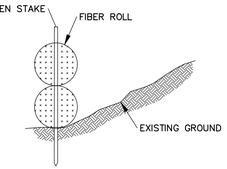


SHALLOW BEDROCK / PYRAMID FIBER ROLL



SINGLE STAKED FIBER ROLL

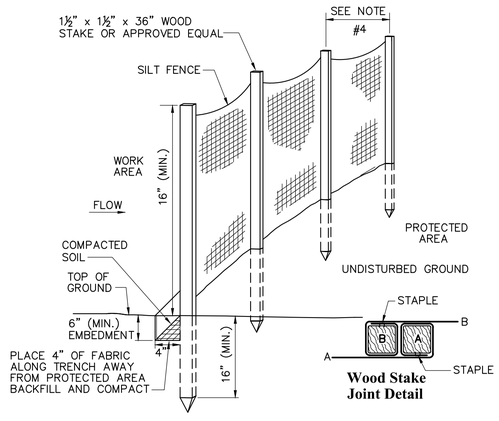


STACKED STAKED FIBER ROLL

Notes:

1. SEE DETAIL # 1A ON SHEET 15-646.01-G-003 FOR LIST OF APPROPRIATE PERIMETER CONTROLS TO USE.
2. FIBER ROLL SHALL BE PLACED IN SHALLOW TRENCH UP TO 4", WHERE FEASIBLE, PLACING SOIL REMOVED FROM TRENCH BEHIND THE ROLL.
3. FIBER ROLLS SHALL BE ANCHORED WITH 2" BY 2" WOODEN STAKES (36" LONG), OR SIMILAR, WHERE FEASIBLE, EITHER INSTALLED THROUGH CENTER OF ROLL (AS SHOWN) OR PLACED ON BOTH SIDES OF ROLL.
4. STAKES TO BE PLACED 4 FT APART, MINIMUM.
5. SINGLE OR DOUBLE STACKED STAKED FIBER ROLLS TO BE INSTALLED WHERE SOIL DEPTH ALLOWS. WHERE SHALLOW TO BEDROCK, PYRAMID FIBER ROLLS TO BE UTILIZED WITH STAKES, AS FEASIBLE.
6. FIBER ROLLS TO BE REPLACED OR REPLENISHED AS NEEDED DURING ACTIVE EARTH WORK.
7. PERIMETER CONTROLS SHALL NOT CROSS ACTIVE ACCESS ROUTES (E.G., ROADS) OR ACTIVE FLOW PATHS (E.G., STREAMS/RIVERS).
8. PERIMETER CONTROLS SHALL REMAIN IN PLACE AND BE MAINTAINED/REPLACED AS NEEDED UNTIL FINAL STABILIZATION IN AREA HAS BEEN ACHIEVED.
9. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ½ OF THE OVERALL HEIGHT. DISPOSE OF IN AN UPLAND AREA AWAY FROM WATER FLOW.

DETAIL 1 — STAKED FIBER ROLL
SCALE N.T.S.



Notes:

1. SEE DETAIL # 1A ON SHEET 15-646.01-G-003 FOR LIST OF APPROPRIATE PERIMETER CONTROLS TO USE.
2. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N OR APPROVED EQUIVALENT. MANUFACTURED SILT FENCE SHALL CONFORM TO THE MOST CURRENT VERMONT DEPARTMENT OF TRANSPORTATION (VTRANS OR VAOT) STANDARDS.
3. FOR FILTER CLOTH FENCE WHEN ELONGATION IS >50%, POST SPACING SHALL NOT EXCEED 4 FT. FOR FILTER CLOTH FENCE WHEN ELONGATION IS <50%, POST SPACING SHALL NOT EXCEED 6 FT.
4. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY 6 INCHES AND FOLDED.
5. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE OR APPROVED EQUIVALENT.
6. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN SEDIMENT REACHES HALF OF FABRIC HEIGHT AND DISPOSED OF IN AN UPLAND AREA.
7. PERIMETER CONTROLS SHALL NOT CROSS ACTIVE ACCESS ROUTES (E.G., ROADS) IR ACTIVE FLOW PATHS (E.G., LARGER STREAMS/RIVERS).
8. PERIMETER CONTROLS SHALL REMAIN IN PLACE AND BE MAINTAINED/REPLACED AS NEEDED UNTIL FINAL STABILIZATION IN THE AREA HAS BEEN ACHIEVED.

DETAIL 3 — SILT FENCE
SCALE N.T.S.

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Doc. No.	EG-303NE
Page: 7-2	Rev. No. 3
Date	08/29/14

SUBJECT: Access, Maintenance and Construction Best Management Practices
Reference: EP No. 3 - Natural Resource Protection (Chapter 6)

BMP DETAIL
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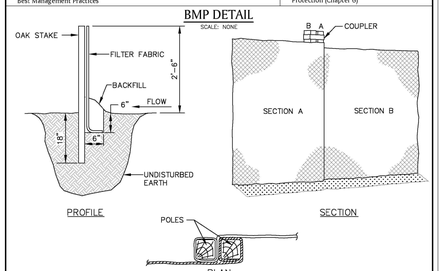

BMP PICTURE

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File: Sediment_Fence.dwg

BMP # 2
SEDIMENT CONTROL FENCE

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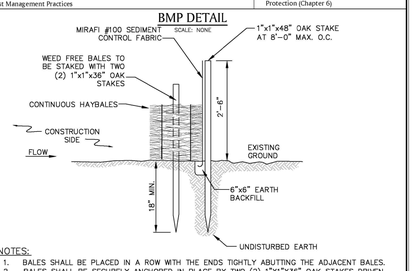
Doc. No.	EG-303NE
Page: 7-3	Rev. No. 3
Date	08/29/14

SUBJECT: Access, Maintenance and Construction Best Management Practices
Reference: EP No. 3 - Natural Resource Protection (Chapter 6)

BMP DETAIL
SCALE: NONE



NOTES:
1. BALES SHALL BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO (2) 1"X1"X36" OAK STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. BALES SHALL BE REMOVED AND REPLACED WHEN THEY BECOME FILLED WITH SEDIMENT AND BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. BALES SHALL BE REMOVED WHEN THE EMBANKMENTS STABILIZE.
6. BALES TO BE TWINE BOUND.

BMP PICTURE

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File: Silt_Fence_&_Barrier.dwg

BMP # 3
SILT FENCE / WEED FREE BARRIER

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Doc. No.	EG-303NE
Page: 7-4	Rev. No. 3
Date	08/29/14

SUBJECT: Access, Maintenance and Construction Best Management Practices
Reference: EP No. 3 - Natural Resource Protection (Chapter 6)

BMP DETAIL
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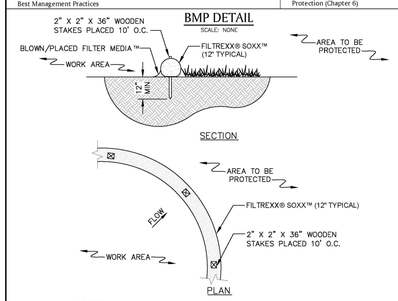

NOTES:
1. PRODUCT TO BE FILTREXX®SILT SOXX™OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
3. FILTER MEDIA™FILL TO MEET APPLICATION REQUIREMENTS.
4. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY NATIONAL GRID ENVIRONMENTAL SCENTIST.

BMP PICTURE

* PICTURE AND DETAIL PROVIDED BY FILTREXX LAND IMPROVEMENT SYSTEMS
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BMP # 4
SILT SOXX *

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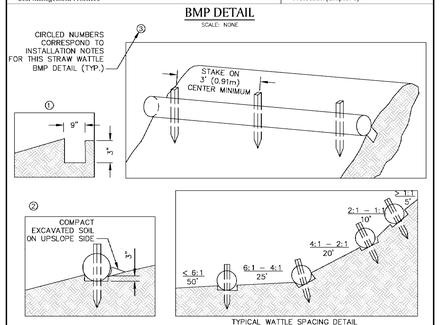
Doc. No.	EG-303NE
Page: 7-5	Rev. No. 3
Date	08/29/14

SUBJECT: Access, Maintenance and Construction Best Management Practices
Reference: EP No. 3 - Natural Resource Protection (Chapter 6)

BMP DETAIL
SCALE: NONE



NOTES:
1. PRODUCT TO BE TENSAR NORTH AMERICAN GREEN STRAW WATTLE OR APPROVED EQUAL BY NATIONAL GRID ENVIRONMENTAL SCIENTIST.
2. TYPICAL WATTLE SPACING BASED ON SLOPE GRADIENT. COORDINATE SPACING AND LOCATION WITH NATIONAL GRID ENVIRONMENTAL SCIENTIST.

INSTALLATION NOTES:
1. BEGIN AT THE LOCATION WHERE THE WATTLE IS TO BE INSTALLED BY EXCAVATING A 2-3" DEEP X 9" WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UPSLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE WATTLE IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT WATTLES SHOULD TIGHTLY ABUT.
3. SECURE THE WATTLE WITH 18-24" STAKES EVERY 3-4' AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE LEAVING AT LEAST 2-3" OF STAKE EXTENDING ABOVE THE WATTLE. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

* DETAIL AND PICTURE PROVIDED BY TENSAR NORTH AMERICAN GREEN
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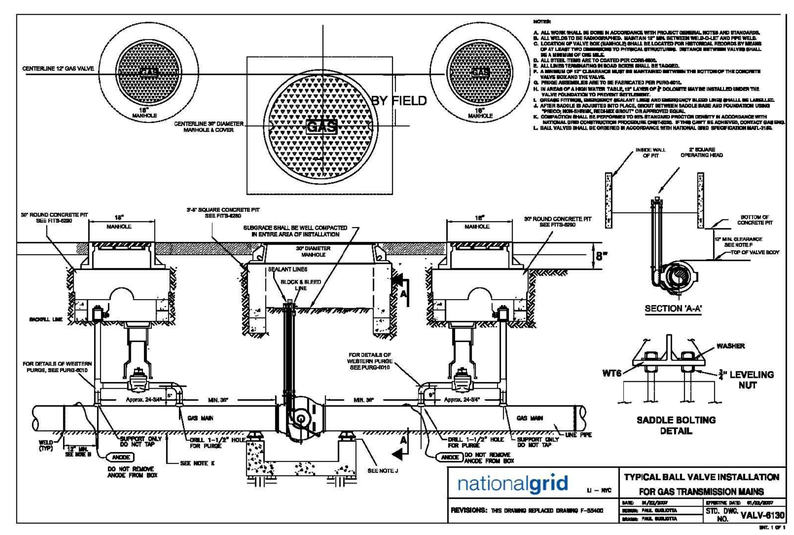
BMP # 5
STRAW WATTLE * (1 OF 2)

DETAIL 2 — EROSION CONTROL DETAILS
SCALE N.T.S.



DETAIL 4 — MAINLINE VALVE
SCALE N.T.S.

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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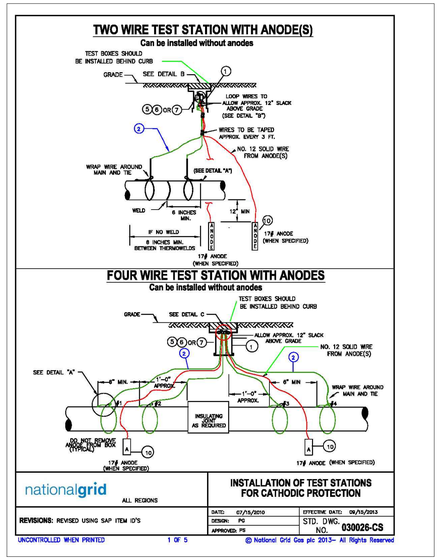
Drawn RJT	Date 01/22/2016	Scale AS NOTED
Chkd. BCK	Design Engr. GEW	Design Supv. JEO

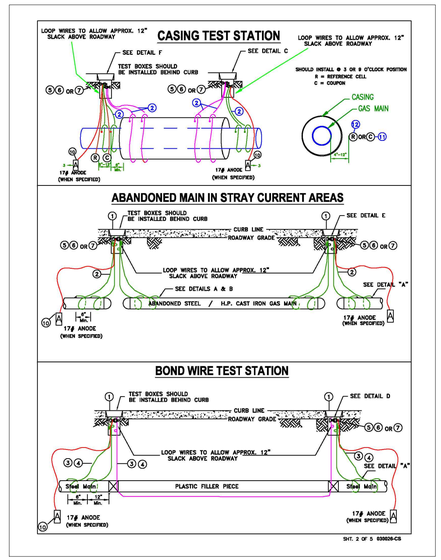
NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
GENERAL DETAILS

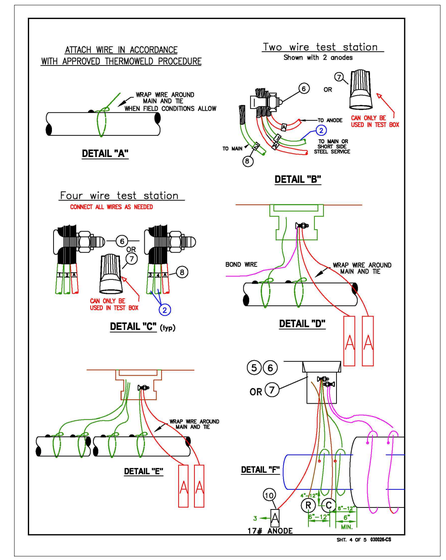
CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
DETAIL SHEETS	GENERAL DETAIL SHEET	G-004

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\DETAIL SHEETS.DWG
Saved: 1/22/2016 10:22:11 AM Plotted: 1/22/2016 1:46:15 PM User: Rowsell, Geoffrey LastSavedBy: 4324

DRAWING NUMBER G-005







MATERIAL LIST

	Description	Down State SAP Item I.D	Upstate SAP Item I.D	New England SAP Item I.D	Rhode Island SAP Item I.D	MATERIAL NOTES
1	TEST BOX WITH COVER or TEST BOX 9" SQUARE HEAVY DUTY COVER FOR 9" SQUARE BOX	9339892 9339391 9339797	9312291 UPSTATE BOXES COME IN ONE PIECE	9339892 9339391 9339797	(Sm – 445) 9311209 or (Lg - 556) in Prov. 9311208	NON LOCKING COVER, DISCARD FOOT PIECE. (PREFERRED USAGE FOR GRASS AND DIRT AREAS) WEIGHS 95 LBS, STREET USE, WITHOUT COVER PREFERRED USAGE FOR ROADWAY INSTALLATIONS NON-LOCKING COVER
2	WIRE, NO. 8, 7 STRAND	9334425	9307539	9334425	9307539	TEST WIRE ONLY, NOT FOR GROUND BEDS, UPSTATE AND RI WIRE HAS 19 STRANDS
3	WIRE, NO. 6, 7 STRAND	9334294	9311795	9334294	9311795	BOND WIRE ONLY, NOT FOR GROUND BEDS
4	WIRE 1/0 – 19 STRAND 600 V –1/C	9334171	NON STOCK	9334171	NON STOCK	USE IN STRAY CURRENT AREAS
5	TAPE, PVC - ¾" WIDE	9334056	9316070	9334056	9316070	NOT FOR PIPE COATING
6	CONNECTOR, SPLIT BOLT, TYPE 6 CONNECTOR, SPLIT BOLT FOR #8 WIRE	9331578 9331641	9316630 9331641	9331578 9331641	NON STOCK 9331641	USE WITH NO. 6 CABLE
7	CONNECTOR, SPLIT BOLT, TYPE 1/01 CONNECTOR, TWIST-ON WIRE NUT	9331612 9330683	- 9314631	9331612 9330683	- 9314631	USE WITH 1/0 CABLE
8	TAG, ADHESIVE NUMBER 1 NUMBER 2 NUMBER 3 NUMBER 4 LETTER A	9340592 9340593 9340594 9340595 9340598	9307918 9307896 9307895 9307894 9307893	9340592 9340593 9340594 9340595 9340598	9307918 9307896 9307895 9307894 9307893	LABEL WITH #1 (N) OR (E), CONSECUTIVELY TO (S) OR (W) SEE DETAILS 'B' AND 'C' USE TO LABEL ANODES
9	GROUNDING CELL	NON STOCK	9315642	NON STOCK	NON STOCK	AS SPECIFIED BY CORROSION ENGINEERING
10	ANODE, MAGNESIUM 17LBS	9339399	9311183	9339399	9311183	SATURATE WITH WATER BEFORE BACKFILL. ANODE MAY BE INSTALLED VERTICALLY OR HORIZONTALLY
11	COUPON	9386100	By Corrosion	9386100	By Corrosion	MC MILLER OR EQUAL
12	REFERENCE CELL	9385758	By Corrosion	9385758	By Corrosion	BORIN MFGR INC OR EQUAL

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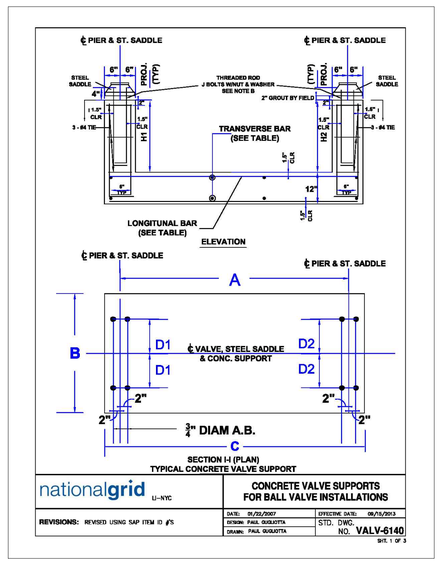
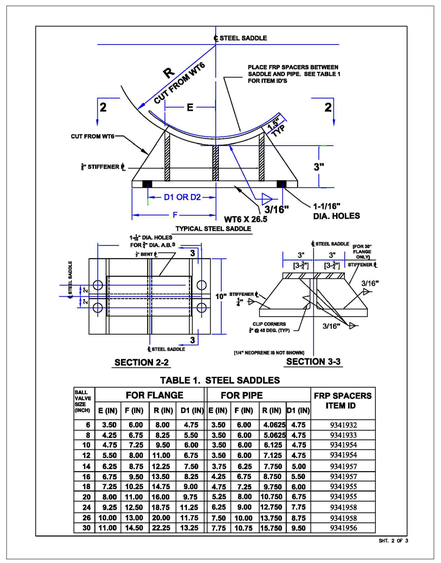
DETAIL 1
SCALE N.T.S.

CATHODIC PROTECTION DETAIL (ITEM NO. XX)





BALL VALVE SIZE (INCH)	FOR FLANGE E (IN)	FOR FLANGE F (IN)	FOR FLANGE R (IN)	FOR FLANGE D1 (IN)	FOR PIPE E (IN)	FOR PIPE F (IN)	FOR PIPE R (IN)	FOR PIPE D1 (IN)	FRP SPACERS ITEM ID
6	3.50	6.00	8.00	4.75	3.50	6.00	4.0625	4.75	9341932
8	4.25	6.75	8.25	5.50	3.50	6.00	5.0625	4.75	9341933
10	4.75	7.25	9.50	6.00	3.50	6.00	6.125	4.75	9341954
12	5.50	8.00	11.00	6.75	3.50	6.00	7.125	4.75	9341954
14	6.25	8.75	12.25	7.50	3.75	6.25	7.750	5.00	9341957
16	6.75	9.50	13.50	8.25	4.25	6.75	8.750	5.50	9341957
18	7.25	10.25	14.75	9.00	4.75	7.25	9.750	6.00	9341955
20	8.00	11.00	16.00	9.75	5.25	8.00	10.750	6.75	9341955
24	9.25	12.50	18.75	11.25	6.25	9.00	12.750	7.75	9341958
26	10.00	13.00	20.00	11.75	7.50	10.00	13.750	8.75	9341958
30	11.00	14.50	22.25	13.25	7.75	10.75	15.750	9.50	9341956

DETAIL 2
SCALE N.T.S.

CONCRETE VALVE SUPPORT DETAIL (ITEM NO. XX)

CONCRETE VALVE SUPPORT DIMENSION FOR FLANGED X FLANGED VALVE

BALL VALVE SIZE	DIMENSIONS A	B	C	D1	D2	REINFORCEMENT LONGITUDINAL (TOP & BOTTOM)	TRANS. (TOP & BOTTOM)	VERTICAL (EACH SIDE)	SUPPORT WEIGHT (LBS)
6	1'-4"	1'-10"	2'-4"	0'-4.75"	0'-4.75"	3 - #4	3 - #4	3 - #4	1487
8	2'-0"	2'-0"	3'-0"	0'-5.5"	0'-5.5"	3 - #4	3 - #4	3 - #4	1800
10	2'-3"	2'-1"	3'-3"	0'-6"	0'-6"	3 - #4	3 - #4	3 - #4	1953
12	2'-3"	2'-2"	3'-2"	0'-6.75"	0'-6.75"	3 - #4	3 - #4	3 - #4	2004
14	2'-6"	2'-4"	3'-6"	0'-7.5"	0'-7.5"	3 - #4	4 - #4	3 - #4	2275
16	2'-9"	2'-5"	3'-9"	0'-8.25"	0'-8.25"	3 - #4	4 - #4	3 - #4	2447
18	3'-0"	2'-7"	4'-0"	0'-9"	0'-9"	4 - #4	4 - #4	4 - #4	2713
20	3'-3"	2'-8"	4'-3"	0'-9.75"	0'-9.75"	4 - #4	4 - #4	4 - #4	2900
24	3'-9"	2'-11"	4'-9"	0'-11.25"	0'-11.25"	4 - #4	4 - #4	4 - #4	3391
26	4'-1"	3'-0"	5'-1"	0'-11.75"	0'-11.75"	4 - #4	4 - #4	4 - #4	3655
30	4'-7"	3'-3"	5'-7"	1'-1.25"	1'-1.25"	4 - #4	5 - #4	4 - #4	4184

H1 = H2 = 1' – 6"

CONCRETE VALVE SUPPORT DIMENSION FOR WELD X WELD VALVE

BALL VALVE SIZE	DIMENSIONS A	B	C	D1	D2	REINFORCEMENT LONGITUDINAL (TOP & BOTTOM)	TRANS. (TOP & BOTTOM)	VERTICAL (EACH SIDE)	SUPPORT WEIGHT (LBS)
6	2'-4"	1'-10"	3'-4"	0'-4.75"	0'-4.75"	3 - #4	4 - #4	3 - #4	1742
8	2'-7"	1'-10"	3'-7"	0'-4.75"	0'-4.75"	3 - #4	4 - #4	3 - #4	1810
10	2'-9"	1'-10"	3'-9"	0'-4.75"	0'-4.75"	3 - #4	4 - #4	3 - #4	1856
12	2'-9"	1'-10"	4'-9"	0'-4.75"	0'-4.75"	3 - #4	4 - #4	3 - #4	1925
14	3'-4"	2'-0"	4'-4"	0'-5.5"	0'-5.5"	3 - #4	4 - #4	3 - #4	2200
16	3'-6"	2'-3"	4'-6"	0'-6.25"	0'-6.25"	3 - #4	4 - #4	3 - #4	2300
18	3'-9"	2'-4"	4'-9"	0'-5.5"	0'-5.5"	3 - #4	4 - #4	3 - #4	2432
20	2'-11"	2'-3"	4'-11"	0'-6.75"	0'-6.75"	3 - #4	5 - #4	3 - #4	2573
24	4'-4"	2'-4"	5'-4"	0'-7.75"	0'-7.75"	3 - #4	5 - #4	3 - #4	2875
26	4'-10"	2'-6"	5'-10"	0'-8.75"	0'-8.75"	4 - #4	5 - #4	4 - #4	3461
30	5'-7"	2'-8"	6'-7"	0'-9.50"	0'-9.50"	4 - #4	6 - #4	4 - #4	3833

H1 = H2 = 1' – 6"

CONCRETE VALVE SUPPORT DIMENSION FOR FLANGED X WELD VALVE

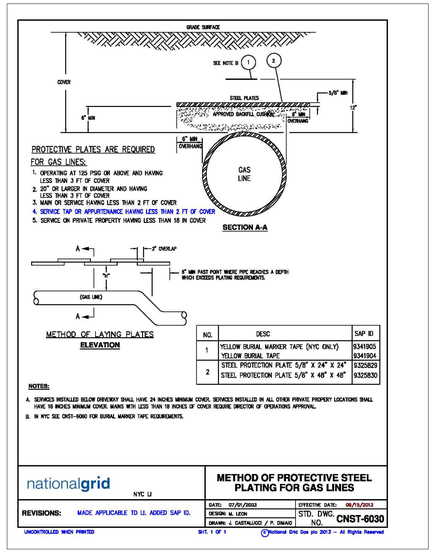
BALL VALVE SIZE	DIMENSIONS A	B	C	D1	D2	H1	REINFORCEMENT LONGITUDINAL (TOP & BOTTOM)	TRANS. (TOP & BOTTOM)	VERTICAL (EACH SIDE)	SUPPORT WEIGHT (LBS)
6	1'-10"	1'-10"	2'-10"	0'-4.75"	0'-4.75"	1'-3"	3 - #4	3 - #4	3 - #4	1535
8	2'-3"	2'-0"	3'-3"	0'-5.50"	0'-4.75"	1'-2.75"	3 - #4	3 - #4	3 - #4	1794
10	2'-6"	2'-1"	3'-6"	0'-6.00"	0'-4.75"	1'-2.625"	3 - #4	4 - #4	3 - #4	1943
12	2'-7"	2'-2"	3'-7"	0'-6.75"	0'-4.75"	1'-2.125"	3 - #4	4 - #4	3 - #4	2053
14	2'-10"	2'-4"	3'-10"	0'-7.5"	1'-1.5"	1'-1.5"	3 - #4	4 - #4	3 - #4	2260
16	3'-2"	2'-5"	4'-2"	0'-8.25"	1'-1.25"	1'-1.25"	3 - #4	4 - #4	3 - #4	2394
18	3'-4"	2'-7"	4'-4"	0'-9"	0'-9"	1'-1"	4 - #4	4 - #4	4 - #4	2660
20	3'-7"	2'-8"	4'-7"	0'-9.75"	0'-8.75"	1'-0.75"	4 - #4	4 - #4	4 - #4	2858
24	4'-2"	2'-11"	5'-2"	0'-11.25"	0'-7.75"	1'-0"	4 - #4	5 - #4	4 - #4	3354
26	4'-6"	3'-1"	5'-6"	0'-11.75"	0'-8.75"	0'-11.75"	4 - #4	5 - #4	4 - #4	3658
30	5'-1"	3'-3"	6'-1"	1'-1.25"	0'-9.50"	0'-11.0"	4 - #4	5 - #4	4 - #4	4184

D1 & H1 DIMENSIONS ARE FOR FLANGED END; H1 AS SHOWN; H2 = 1' – 6"

TABLE NOTES: A" & "C" DIMENSIONS GIVEN IN THE TABLE ARE FOR HYPERSHERE BALL VALVES (CLASS 300#) MANUFACTURED BY CAMERON & GROVE. SHOULD CORRESPONDING DIMENSIONS OFF OTHERS VALVES DIFFER, AN ADJUSTMENT WOULD BE NECESSARY PRIOR TO THE MANUFACTURING OF THIS CONCRETE VALVE SUPPORT ASSEMBLY.
FOR FLANGED X FLANGED VALVES: A = RF — RF = FLANGE TO FLANGE DISTANCE
FOR WELD X WELD VALVES: A = WE + 0'-10.5" — WE = WELD TO WELD DISTANCE
FOR FLANGED X WELD VALVES: A = 5 X RF + 5.6 WE + 0'-5".*
* (UNLESS THIS DIMENSION IS GREATER THAN CORRESPONDING ONE IN TABLE, NO ADJUSTMENT IS REQUIRED.

GENERAL NOTES:
A. ALL CONCRETE SHALL BE PRECAST CONCRETE (MANUFACTURED UNDER PLANT CONTROL) HAVING A MINIMUM COMPRESSIVE STRENGTH OF 3000PSIG AT 28 DAYS AND SHALL BE IN ACCORDANCE WITH ASTM C94.
B. ANCHOR BOLTS ARE TO BE A-36 STEEL, 36" LONG INCLUDING 4.5" STANDARD THREAD AND 4" HOOK, WITH 2 HEX NUTS & 1 WASHER AND HOT DIPPED GALVANIZED PER ASTM A-153.
C. REINFORCING STEEL IS TO HAVE A YIELD STRENGTH OF 60,000 PSIG AND SHALL BE IN ACCORDANCE WITH ASTM 615.
D. ALL STRUCTURAL STEEL IS TO BE A-36 STEEL FABRICATED AND WELDED IN ACCORDANCE WITH THE LATEST AISC SPECS AND IS TO BE HOT DIPPED GALVANIZED PER ASTM-A123.
E. FOR ALL WELDS E70XX ELECTRODES ARE TO BE USED.

SHT. 3 OF 3 VALV-6140



DETAIL 3
SCALE N.T.S.

PROTECTIVE STEEL PLATE DETAIL (ITEM NO. XX)

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID–CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
GENERAL DETAILS

CAD FILE NAME: DETAIL SHEETS | SEQUENCE No. | DRAWING NUMBER: G–005

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Alignment	Station	Town	Road	Feature Crossed	Size	Crossing Type	Method	Description
A1	136+50	Yarmouth / Dennis	Highbank Road	Bass River	River	Bridge Attachment	Use spare north utility bay in existing bridge	Crossing the Bass River via Highbank Road bridge attachment
A1	276+50	Harwich	Depot Street	Route 6 Mass DOT Jurisdiction	350'	Road crossing	Open cut trench (in pavement)	Pipe alignment crosses under Route 6 on Depot Street. No work on Route 6 is required
A1	313+25	Brewster	Slough Road	Possible Pipe Culvert	UNK.	UNK.	Open cut trench (in pavement)	connects wetlands
A1	332+50	Brewster	Slough Road	Possible Pipe Culvert	UNK.	UNK.	Open cut trench (in pavement)	connects wetlands
A1	376+75	Brewster	Slough Road	Possible Pipe Culvert	UNK.	UNK.	Open cut trench (in pavement)	connects wetlands
A1	379+50	Brewster	Slough Road	Pipe Culvert	12"	Corugated Metal Pipe (CMP)	Open cut trench (in pavement)	connects wetlands
A1	493+40	Brewster	Stony Brook Road	Grist Mill / Herring Run	42"	Concrete Culvert	Open cut trench (in pavement)	stream crossing
A2	15+90	Harwich	Main Street	West Reservoir Stream	96"	Granite Culvert	Open cut trench (in pavement)	stream crossing
A2	169+83	Harwich	Queen Anne Road	Pipe Culvert	24"	Reinforced Concrete Pipe (RCP)	Open cut trench (in pavement)	wetland crossing
A2	225+75	Harwich	Queen Anne Road	Pipe Culvert	12"	Reinforced Concrete Pipe (RCP)	Open cut trench (in pavement)	wetland crossing
A3	86+50	Harwich	Depot Road	Route 28 (Main Street) Mass DOT Jurisduction	120'	Road crossing	Jack and Bore	Mass DOT Road Crossing. Requirement for Jack and Bore crossing to be discussed with Mass DOT

DETAIL 1
SCALE N.T.S.

GAS CROSSING LOCATIONS

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
GENERAL DETAILS

CAD FILE NAME: DETAIL SHEETS
SEQUENCE No.
DRAWING NUMBER: G-007

DRAWING NUMBER G-007

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DRAWING NUMBER
G-008

BILL OF MATERIALS										MATERIAL TRACKING						
ITEM	DESCRIPTION	NATIONAL GRID REFERENCE	Detail Plan Sheet Reference	SIZE (IN.)	THICKNESS (IN.)	RATING	MATERIAL SPECIFICATION	QTY	UOM	MATERIAL PROVIDED BY	PO#	DISTRIBUTOR	MANUFACTURER	HEAT NUMBER	SERIAL NUMBER	NOTES /OTHER
PIPING ITEMS																
1	PIPE, CARBON STEEL, WITH PRITEC 10/40 MILL COATING, WITH 30 DEGREES BEVELED END FOR WELDING	120020-MS	-	12	0.375	-	X42, API 5L, PSL-2	87640	FT							
2	PIPE, CARBON STEEL, WITH PRITEC 10/40 MILL COATING, WITH 30 DEGREES BEVELED END FOR WELDING	120020-MS	-	20	0.375	-	X52, API 5L, PSL-2	1000	FT							
3	PIPE, CARBON STEEL, WITH 16 MILS FBE / 25 MILS POWERCRETE WITH 30 DEGREES BEVELED END FOR WELDING	120020-MS	-	12	0.375	-	X42, API 5L, PSL-2	205	FT							
4	BALL VALVE - CLASS 300, FULL PORT, STEEL, TRUNION MOUNTED BALL, WELD END X WELD END, WORM GEAR OPERATED, 2 INCH SQUARE OPERATING NUT, WATERTIGHT GEAR HOUSING SUITABLE FOR BURIED SERVICE, 36" COVER	MATL-3150 VALV-6130	4, G-004	20	-	-	API 6D, ASME B31.8	2	QTY							
5	BALL VALVE - CLASS 300, FULL PORT, STEEL, TRUNION MOUNTED BALL, WELD END X WELD END, WORM GEAR OPERATED, 2 INCH SQUARE OPERATING NUT, WATERTIGHT GEAR HOUSING SUITABLE FOR BURIED SERVICE, 36" COVER	MATL-3150 VALV-6130	4, G-004	12	-	-	API 6D, ASME B31.8	21	QTY							
6	STEEL WELD END CONCENTRIC REDUCER	MATL-3110 (FITS-6090)	-	20 X 12	0.375	-	MSS SP-75, Grade WPHY-52	1	QTY							
7	11.25 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	12	0.375	-	MSS SP-75, Grade WPHY-42	72	QTY							
8	11.25 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	20	0.375	-	MSS SP-75, Grade WPHY-52	2	QTY							
9	22.5 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	12	0.375	-	MSS SP-75, Grade WPHY-42	26	QTY							
10	22.5 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	20	0.375	-	MSS SP-75, Grade WPHY-52	-	QTY							
11	45 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	12	0.375	-	MSS SP-75, Grade WPHY-42	40	QTY							
12	45 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	20	0.375	-	MSS SP-75, Grade WPHY-52	3	QTY							
13	90 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	12	0.375	-	MSS SP-75, Grade WPHY-42	1	QTY							
14	90 DEGREE, 3D ELBOW WITH CHARPY AND CMTR DATA SHEETS	MATL-3110 (FITS-6080)	-	20	0.375	-	MSS SP-75, Grade WPHY-52	2	QTY							
15	FORGED STEEL REDUCING TEE (BARRED)	MATL-3110 (FITS-6050)	-	20 X 20 X 12	0.375	-	MSS SP-75, Grade WPHY-52	2	QTY							
16	FORGED STEEL TEE (BARRED)	MATL-3110 (FITS-6050)	-	12 X 12 X 12	0.375	-	MSS SP-75, Grade WPHY-42	2	QTY							
17	WESTERN PURGE (INCLUDING ALL DETAIL ITEMS)	PURG 5010	2, G-003	-	-	-	-	44	QTY							
18	SHRINK SLEEVE FOR WELD JOINT COATING REPAIR CANUSA K-60, "L THICKNESS", YELLOW COLOR OR EQUAL	-	-	-	-	-	-	-	QTY							
19	TAPECOAT H35G (COATING REPAIR & ELBOWS)	-	-	-	-	-	-	-	QTY							
20	TAPECOAT T-TAPE (FITTINGS)	-	-	-	-	-	-	-	QTY							
BRIDGE ATTACHMENT ITEMS																
21	SEE BOM SHEET M-003	-		-	-	-	-	-	-							
CATHODIC PROTECTION ITEMS																
22	TWO WIRE TEST STATION WITH ANODES	030026-CS	1, G-005	-	-	-	-	78	QTY							
23	FOUR WIRE TEST STATION WITH ANODES	030026-CS	1, G-005	-	-	-	-	22	QTY							
24	CASING WIRE TEST STATION WITH ANODES	030026-CS	1, G-005	-	-	-	-	2	QTY							
25	INSULATING JOINT, WELD END, CLASS 300 KEROTEST, ZUNT, PSI OR TUBE TURNS	FITS-6015 030028-CS	-	12	0.375	-	ENDS TO API 5L PSL2 X42	21	QTY							
26	INSULATING JOINT, WELD END, CLASS 300 KEROTEST, ZUNT, PSI OR TUBE TURNS	FITS-6015 030028-CS	-	20	0.375	-	ENDS TO API 5L PSL2 X52	1	QTY							
CONNECTION DETAIL ITEMS																
27	TDW LINE STOP VERTICAL TEE		F-SERIES (001-007)	20x20X20	0.375	-	MSS SP-75, Grade WPHY-52	2	QTY							
28	REDUCING BARRED TEE	-	F-SERIES (001-007)	20x20X12	0.375	-	MSS SP-75, Grade WPHY-52	1	QTY							
29	BARRED TEE	-	F-SERIES (001-007)	12x12x6	0.375	-	MSS SP-75, Grade WPHY-42	4	QTY							
30	TEE	-	F-SERIES (001-007)	4X4X4	0.237 (STD)	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							
31	TEE	-	F-SERIES (001-007)	6X6X6	0.280 (STD)	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							
32	CONC. REDUCER	-	F-SERIES (001-007)	6X4	0.280 X 0.237 (STD)	-	ASME B16.9, ASTM A234 GRADE B	4	QTY							
33	CONC. REDUCER	-	F-SERIES (001-007)	8X6	0.322 X 0.280 (STD)	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							
34	CS END CAP	-	F-SERIES (001-007)	20	0.375	-	MSS SP-75, Grade WPHY-52	2	QTY							

DETAIL 1
SCALE N.T.S.

BILL OF MATERIALS

No.	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

BILL OF MATERIALS

CAD FILE NAME: DETAIL SHEETS | SEQUENCE No. | DRAWING NUMBER: G-008

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\DETAIL SHEETS.DWG
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DRAWING NUMBER G-009

BILL OF MATERIALS										MATERIAL TRACKING						
ITEM	DESCRIPTION	NATIONAL GRID REFERENCE	Detail Plan Sheet Reference	SIZE (IN.)	THICKNESS (IN.)	RATING	MATERIAL SPECIFICATION	QTY	UOM	MATERIAL PROVIDED BY	PO#	DISTRIBUTOR	MANUFACTURER	HEAT NUMBER	SERIAL NUMBER	NOTES /OTHER
PIPING ITEMS																
35	CS END CAP	-	F-SERIES (001-007)	4	0.237 (STD)	-	ASME B16.9, ASTM A234 GRADE B	2	QTY							
36	45 DEGREE LONG RADIUS ELBOW	-	F-SERIES (001-007)	6	0.280 (STD)	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							
37	90 DEGREE LONG RADIUS ELBOW	-	F-SERIES (001-007)	6	0.280 (STD)	-	ASME B16.9, ASTM A234 GRADE B	3	QTY							
38	90 DEGREE LONG RADIUS ELBOW		F-SERIES (001-007)	12	0.375	-	MSS SP-75, Grade WPHY-42	1	QTY							
39	BALL VALVE - CLASS 300, FULL PORT, STEEL, TRUNION MOUNTED BALL, WELD END X WELD END, WORM GEAR OPERATED, 2 INCH SQUARE OPERATING NUT, WATERTIGHT GEAR HOUSING SUITABLE FOR BURIED SERVICE, 36" COVER	MATL-3150 VALV-6130	F-SERIES (001-007)	6	0.280 (STD)	-	API 6D, ASME B31.8	4	QTY							
40	BALL VALVE - CLASS 300, FULL PORT, STEEL, TRUNION MOUNTED BALL, WELD END X WELD END, WORM GEAR OPERATED, 2 INCH SQUARE OPERATING NUT, WATERTIGHT GEAR HOUSING SUITABLE FOR BURIED SERVICE, 36" COVER	MATL-3150 VALV-6130	F-SERIES (001-007)	8	0.322 (STD)	-	API 6D, ASME B31.8	1	QTY							
41	CS PIPE	-	F-SERIES (001-007)	4	0.237 (STD)	-	API 5L GRADE B	UNK.	FT							
42	CS PIPE	-	F-SERIES (001-007)	6	0.280 (STD)	-	API 5L GRADE B	UNK.	FT							
43	CS PIPE	-	F-SERIES (001-007)	8	0.322 (STD)	-	API 5L GRADE B PSL2	UNK.	FT							
44	MUELLER LINE STOPPER	FITS-6055	F-SERIES (001-007)	12	-	-	-	12	QTY							
45	MUELLER LINE STOPPER	FITS-6055	F-SERIES (001-007)	6	-	-	-	6	QTY							
46	MUELLER LINE STOPPER	FITS-6055	F-SERIES (001-007)	4	-	-	-	4	QTY							
47	ALH BAG	HTAP6030	F-SERIES (001-007)	12	-	-	-	12	QTY							
48	ALH BAG	HTAP6030	F-SERIES (001-007)	6	-	-	-	6	QTY							
49	ALH BAG	HTAP6030	F-SERIES (001-007)	4	-	-	-	4	QTY							
50	VENT - 1-1/4" WELDOLET, PIPE, VALVE AND PLUG, CLASS 300, SCH40 / STD - CS ASTM A105/106 MATERIALS	-	F-SERIES (001-007)	1.25	SCH 40 / STD	-	ASTM A105 / ASTM A106	7	QTY							
51	VENT / DRAIN - 2" WELDOLET, PIPE, VALVE & PLUG CLASS 300, SCH40 / STD - CS ASTM A105/106 MATERIALS		F-SERIES (001-007)	2.00	SCH 40 / STD	-	ASTM A105 / ASTM A106	12	QTY							
PIG LAUNCHER /RECEIVER CONNECTION ITEMS																
54	REDUCING BARRED TEE	-	F-SERIES 008-010	20X20X8	0.375	-	MSS SP-75, Grade WPHY-52	1	QTY							
55	REDUCING BARRED TEE	-	F-SERIES 008-010	20X20X12	0.375	-	MSS SP-75, Grade WPHY-52	1	QTY							
56	BARRED TEE	-	F-SERIES 008-010	12X12X12	0.375	-	MSS SP-75, Grade WPHY-42	5	QTY							
57	REDUCING BARRED TEE	-	F-SERIES 008-010	12X12X6	0.375	-	MSS SP-75, Grade WPHY-42	1	QTY							
58	TEE	-	F-SERIES 008-010	6X6X6	0.375	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							

DETAIL 1
SCALE N.T.S.

BILL OF MATERIALS

No.	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

BILL OF MATERIALS

CAD FILE NAME: DETAIL SHEETS | SEQUENCE No. | DRAWING NUMBER: G-009

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\DETAIL SHEETS.DWG
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DRAWING NUMBER
G-010

ITEM	DESCRIPTION	NATIONAL GRID REFERENCE	Detail Plan Sheet Reference	SIZE (IN.)	THICKNESS (IN.)	RATING	MATERIAL SPECIFICATION	QTY	UOM	MATERIAL PROVIDED BY	PO#	DISTRIBUTOR	MANUFACTURER	HEAT NUMBER	SERIAL NUMBER	NOTES /OTHER
PIPING ITEMS																
59	BALL VALVE - CLASS 300, FULL PORT, STEEL, TRUNION MOUNTED BALL, WELD END X WELD END, WORM GEAR OPERATED, 2 INCH SQUARE OPERATING NUT, WATERTIGHT GEAR HOUSING SUITABLE FOR BURIED SERVICE, 36" COVER	MATL-3150	F-SERIES 008-010	12	0.375	-	API 6D, ASME B31.8	6	QTY							
60	CONC. REDUCER	-	F-SERIES 008-010	20X12	0.375	-	MSS SP-75, Grade WPHY-52	1	QTY							
61	CONC. REDUCER	-	F-SERIES 008-010	8X6	0.322 X 0.280 (STD)	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							
62	CS END CAP	-	F-SERIES 008-010	6	0.280 (STD)	-	ASME B16.9, ASTM A234 GRADE B	1	QTY							
63	CS PIPE	-	F-SERIES 008-010	8	0.322 (STD)	-	API 5L GRADE B PSL2	UNK.	FT							
64	CS PIPE	-	F-SERIES 008-010	6	0.280 (STD)	-	API 5L GRADE B	UNK.	FT							
65	RF BLIND FLANGE, CLASS 300		F-SERIES 008-010	8	-	-	ASTM A105	5	QTY							
66	RF BLIND FLANGE, CLASS 300		F-SERIES 008-010	12	-	-	ASTM A105	5	QTY							
67	MUELLER LINE STOP	FITS-6055	F-SERIES 008-010	6	-	-	-	1	QTY							
68	ALH BAG	HTAP6030	F-SERIES 008-010	6	-	-	-	1	QTY							
69	VENT	-	F-SERIES 008-010	6	-	-	-	1	QTY							
70	PIG LAUNCHER DESIGN (SEE NG DETAIL FOR BOM)	CS-MAIN007	-	-	-	-	-	-	2							
71	PIG RECEIVER DESIGN (SEE NG DETAIL FOR BOM)	CS-MAIN010	-	-	-	-	-	-	2							

DETAIL 1
SCALE N.T.S.

BILL OF MATERIALS

No.	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
BILL OF MATERIALS

CAD FILE NAME: DETAIL SHEETS
SEQUENCE No.
DRAWING NUMBER: G-010

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\DETAIL SHEETS.DWG
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DRAWING NUMBER
M-001

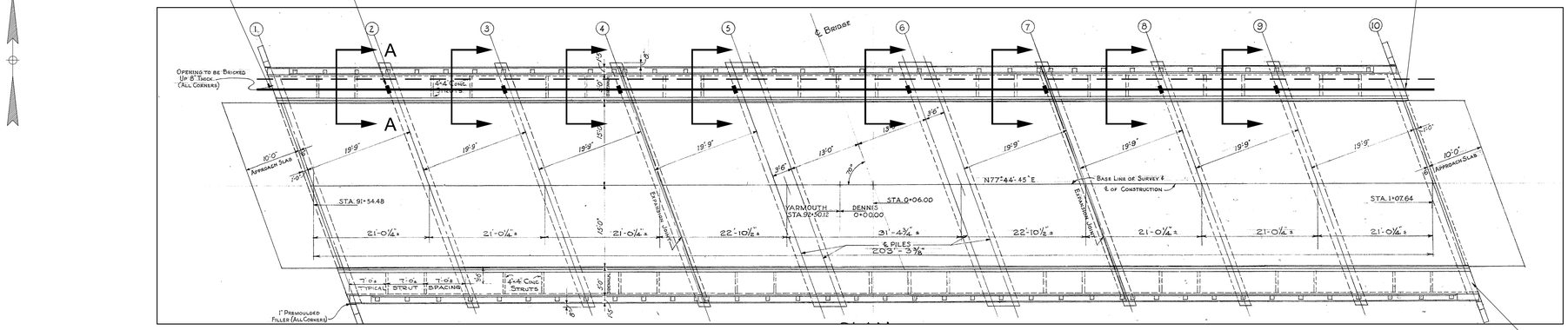
EXISTING 10"-CS-200#-2010 GAS TRANSMISSION MAIN

PROPOSED 12"-CS-270# GAS TRANSMISSION MAIN

PIPE ROLLER SUPPORT LOC. (TYP.)
8 LOCATIONS

REFERENCE DETAIL ON M-003
FOR "LINKSEAL" PENETRATION

REFERENCE DETAIL ON M-003
FOR "LINKSEAL" PENETRATION



PLAN
SCALE 1"=1'-0"

NOT FOR CONSTRUCTION

SOUTH BAY CAPACITY FULLY UTILIZED WITH EXISTING:
10-CS-200#-1963 GAS TRANSMISSION MAIN
TELEPHONE / UTILITY DUCT BANK

PHOTO OF SECTION A-A
(LOOKING EAST)

* "RED" IS THE PROPOSED 12" PIPE LOCATION

PHOTO OF BASS RIVER BRIDGE
(LOOKING NORTHEAST)

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	LZ	BCK	GEW	JEO

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NATIONAL GRID GAS

MID-CAPE MAIN REPLACEMENT
BASS RIVER BRIDGE
PIPE ATTACHMENT SUPPORT

BRIDGE PLAN AND PHOTOS

Drawn LZ	Date 01/22/2016	Scale AS SHOWN	CAD FILE NAME 29847-M001	SEQUENCE No.	DRAWING NUMBER M-001
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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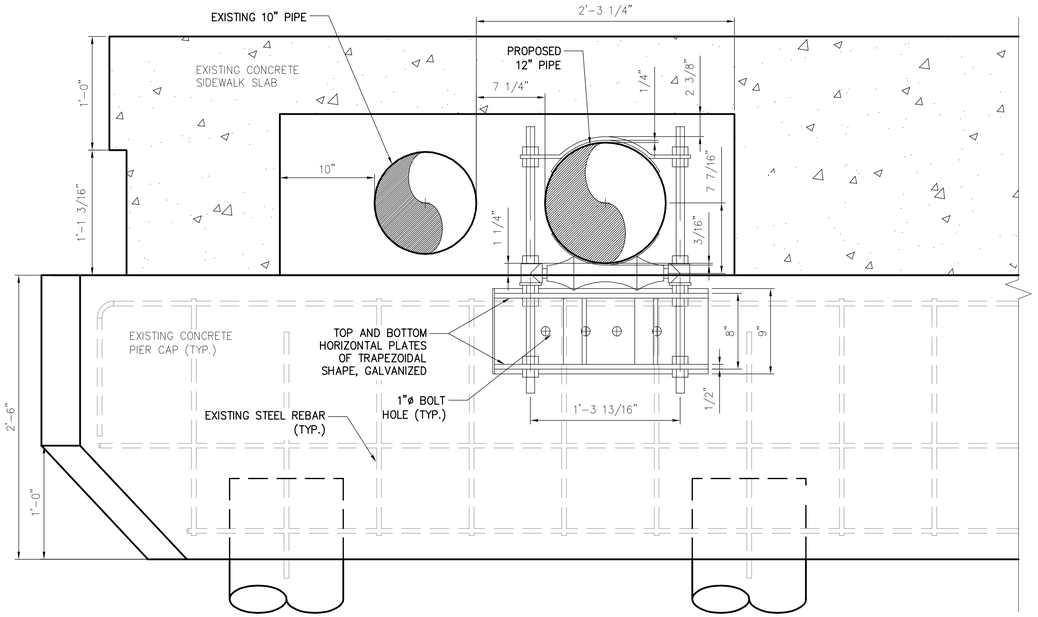
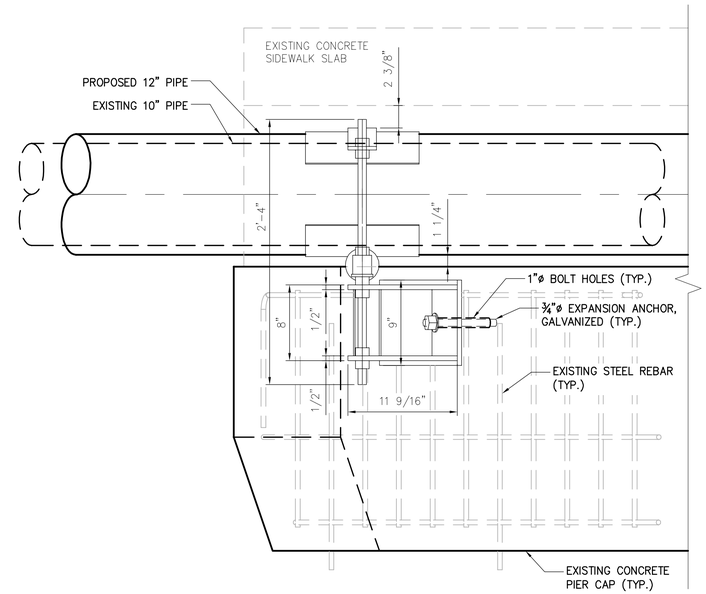
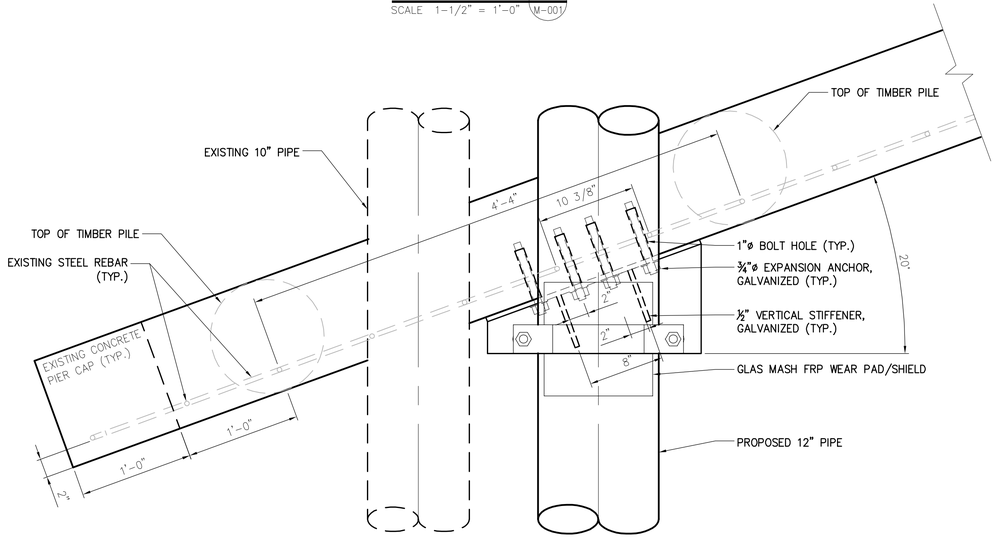
DRAWING NUMBER M-002



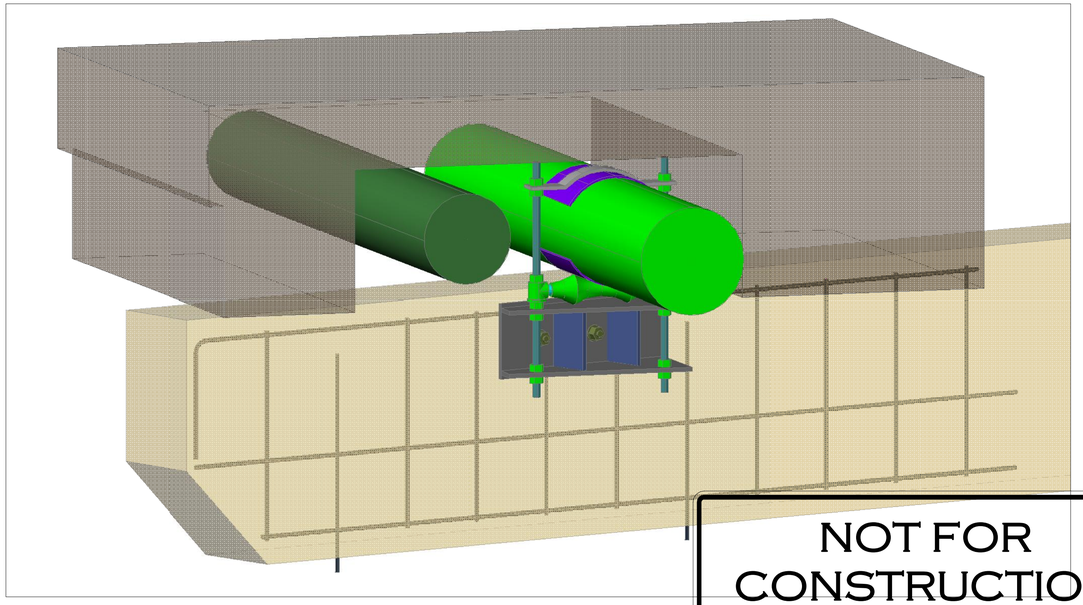
SECTION A
SCALE 1-1/2" = 1'-0" M-001



ELEVATION
SCALE 1-1/2" = 1'-0"
(LOOKING NORTH)



PLAN
SCALE 1-1/2" = 1'-0"



NOT FOR CONSTRUCTION

NOTES:

1. EXISTING REBAR POSITIONS ARE TAKEN FROM ORIGINAL BRIDGE "ISSUE FOR CONSTRUCTION" DRAWINGS, DATED 9/19/53, SHEET 2 OF 3
2. THIS DRAWING IS TYPICAL FOR ALL EIGHT (8) PIPE SUPPORT LOCATIONS
3. MEASUREMENTS ARE TYPICAL. EACH PIER CAP AND CONCRETE SLAB DIMENSIONS & CLEARANCES MAY DIFFER BASED ON CONSTRUCTION AT EACH LOCATION.

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	LZ	BCK	GEW	JEO

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NATIONAL GRID GAS

MID-CAPE MAIN REPLACEMENT
BASS RIVER BRIDGE
PIPE ATTACHMENT SUPPORT

SECTION, ELEVATION, PLAN & 3D MODEL

Drawn LZ	Date 01/22/2016	Scale AS SHOWN	CAD FILE NAME 29847-M002	SEQUENCE No.	DRAWING NUMBER M-002
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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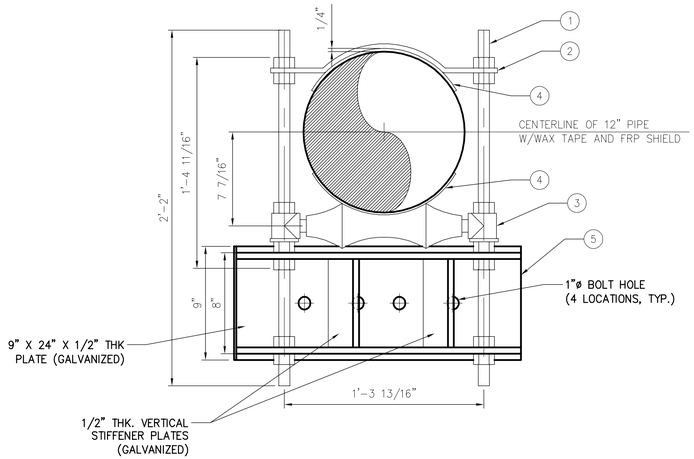
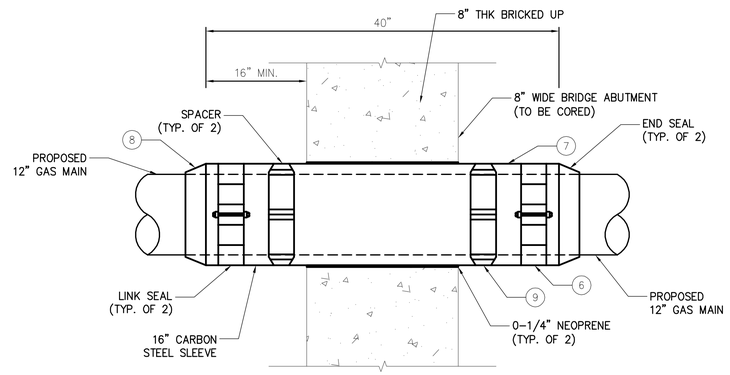
DRAWING NUMBER
M-003



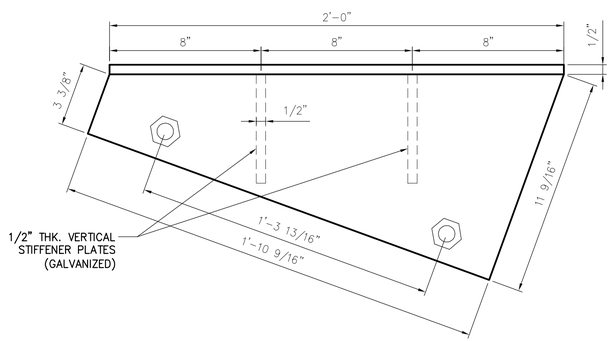
DETAIL 1
SCALE 1" = 0'-6"

12" ROLLER SUPPORT
W/ HOLD DOWN
(8 LOCATIONS REQUIRED)



DETAIL 2
SCALE 1" = 1'-0"

BRIDGE ABUTMENT
(2 LOCATIONS REQUIRED)



DETAIL 3
SCALE 1" = 0'-4"

SPECIAL MOUNTING BRACKET
TOP VIEW

BILL OF MATERIALS
(EACH LOCATION)

ESTIMATE OF QUANTITIES			
ITEM No.	SUPPLIED BY	ITEM DESCRIPTION	QUANTITY
1	LB&A	7/8" x 28" ALL THREAD ROD W/ 7 HEX NUTS	2
2	LB&A	3/8"X3" HOLD DOWN STRAP	1
3	LB&A	12" NON CONDUCTIVE ROLLER, AXLE AND SOCKETS	1
4	LB&A	GLAS MESH FRP WEAR PAD / SHIELD – 1/4" THICK	2
5	LB&A	SPECIAL MOUNTING BRACKET, GALVANIZED, PER DETAIL 3	1
6	NGRID	LINK-SEAL MODULAR SEAL, MODEL NO. LS-475-S316-17	4
7	NGRID	PIPE, 16" CARBON STEEL, SCH 20, 0.250" WALL, BARE	40" LF
8	NGRID	SEALS-CASING-MOLDED RUBBER PULL-ON 12-INCHx16-INCH	4
9	NGRID	INSULATOR, PLASTIC, CASING, 12 IN NOMINAL PIPE X 16 IN NOMINAL CASING	4

NOTE:

LB&A TO SUPPLY CUSTOMIZED PIPE ROLLER SUPPORT PER DETAIL 1 & 3. BILL OF MATERIALS IS PRELIMINARY AND TO BE FINALIZED PRIOR TO PROCUREMENT

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NATIONAL GRID GAS

MID-CAPE MAIN REPLACEMENT
BASS RIVER BRIDGE
PIPE ATTACHMENT SUPPORT

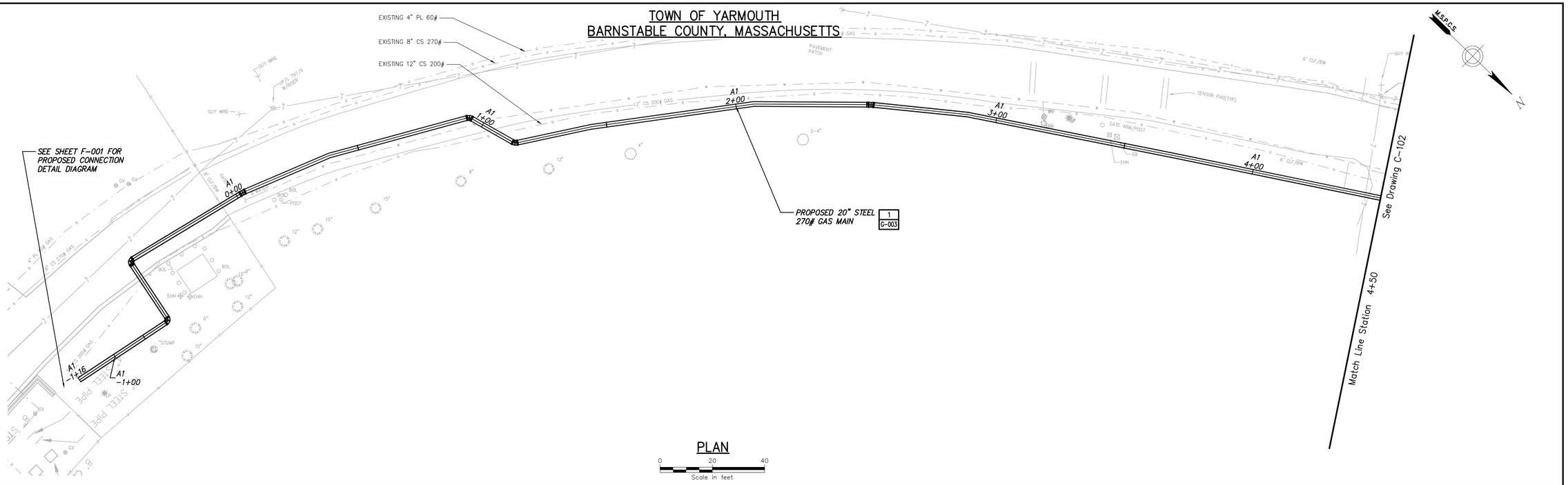
DETAILS

CAD FILE NAME: M-003 BRIDGE DETAILS
SEQUENCE No.:
DRAWING NUMBER: M-003

File: V:\PROJECTS\NMA78\PROJ1\29847\CADD_ACAD\MECH\M-003 BRIDGE DETAILS.DWG
Saved: 1/22/2016 1:09:18 PM Plotted: 1/22/2016 1:10:39 PM User: Zeng, Li LastSavedBy: 4346

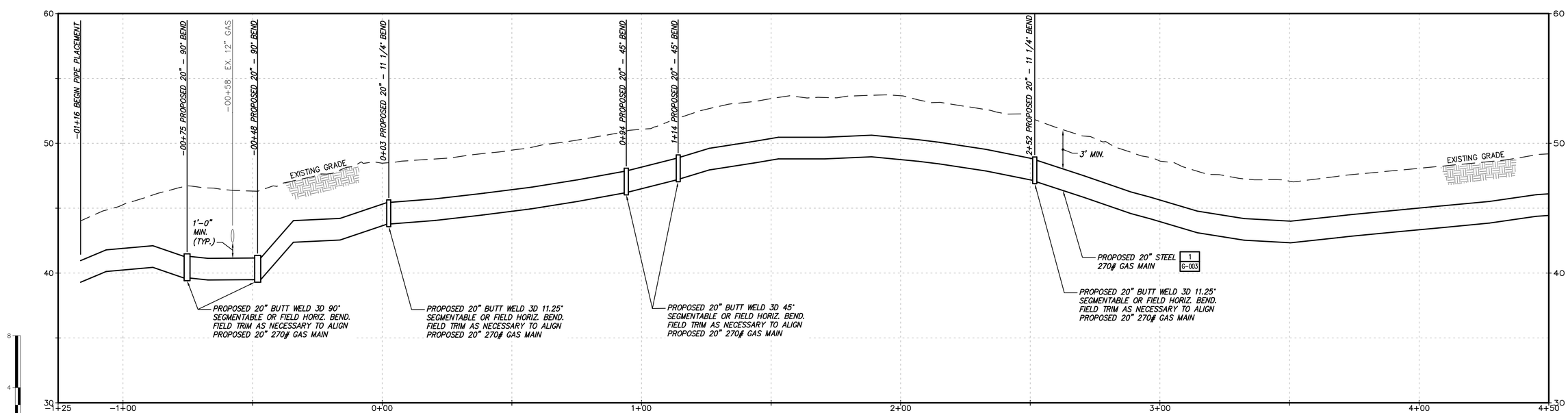
DRAWING NUMBER C-101

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	CEW	JEO

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Drawn RJT	Date 01/22/2016	Scale AS NOTED
Chkd. BCK	Design Engr. CEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-101-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-101-29847		C-101

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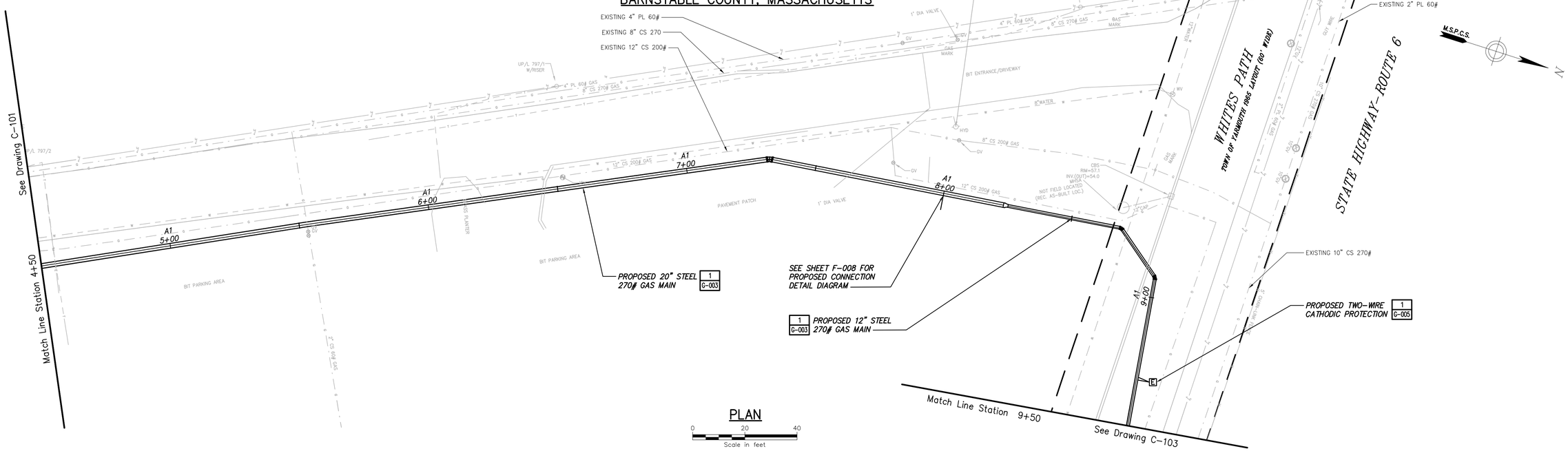
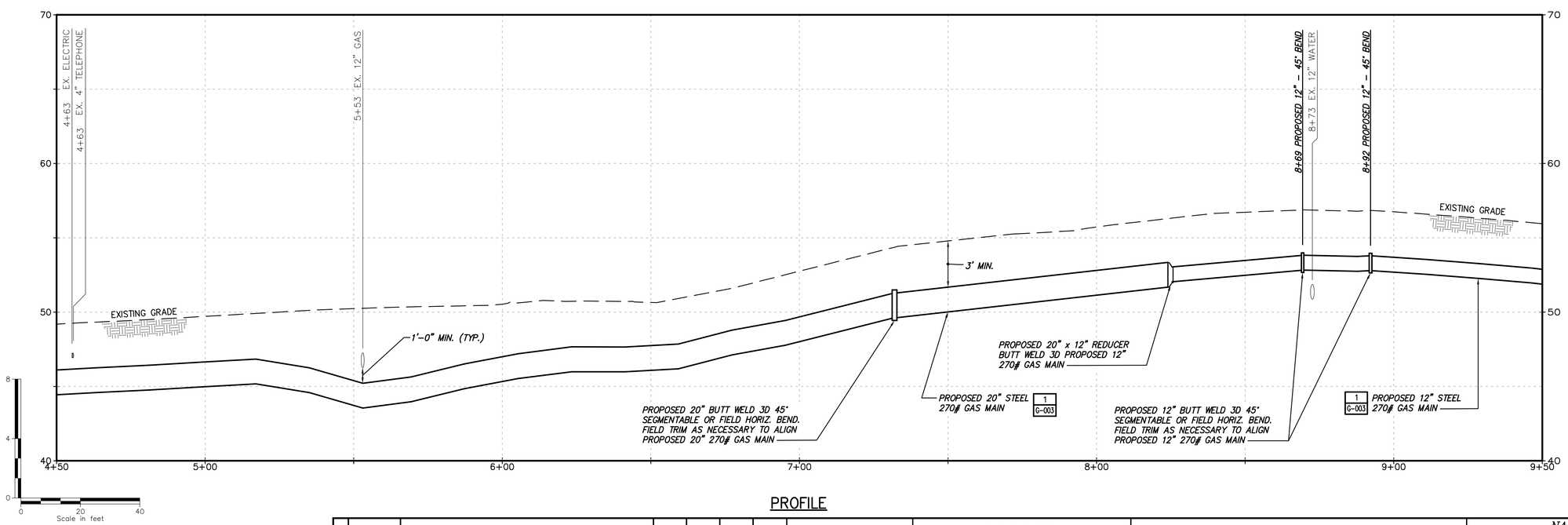
DRAWING NUMBER C-102

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-102-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-102-29847		C-102

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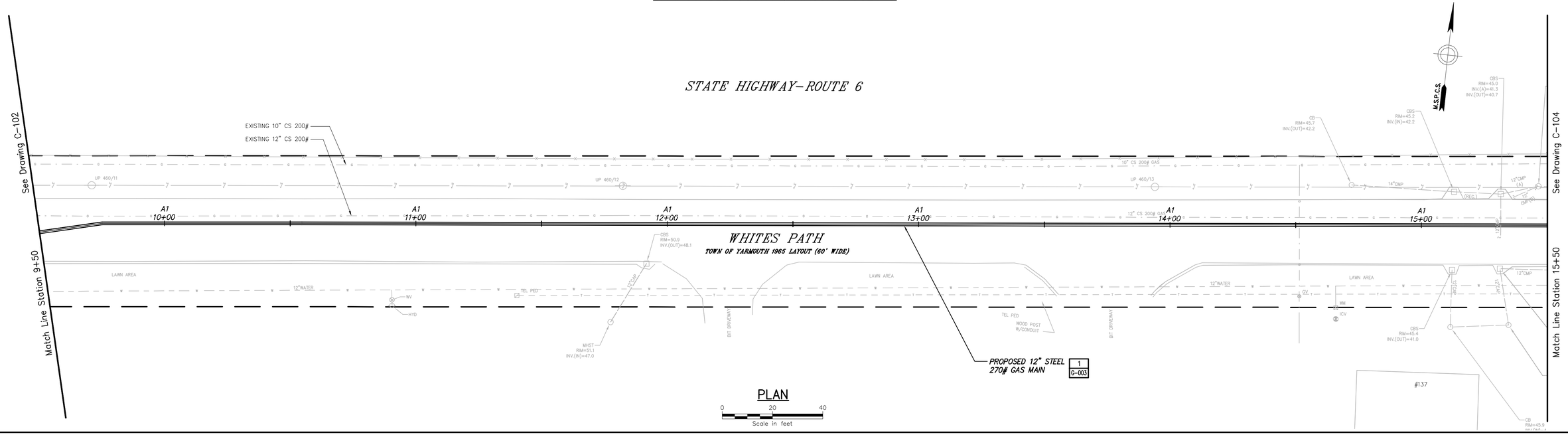
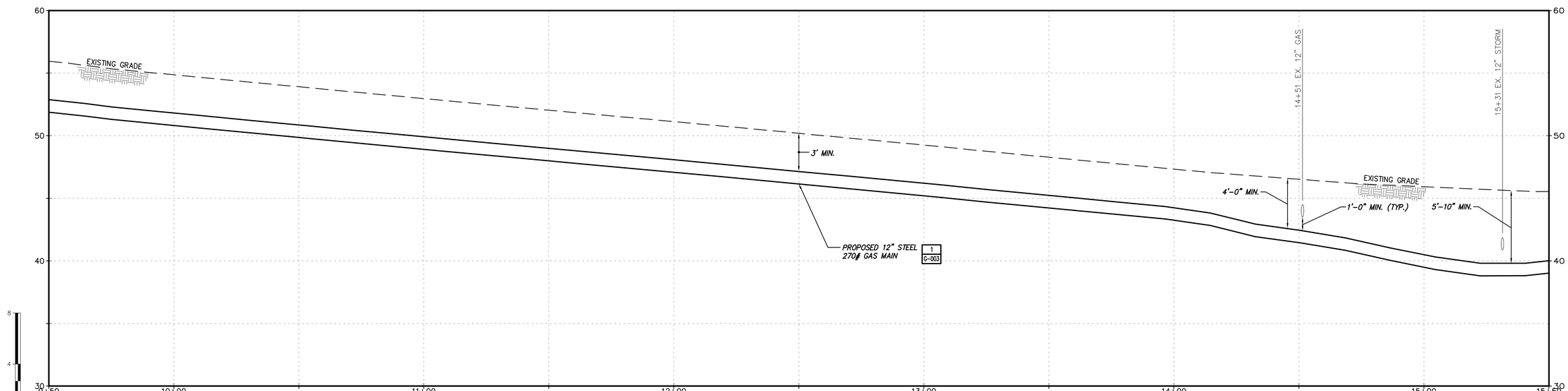
DRAWING NUMBER C-103

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-103-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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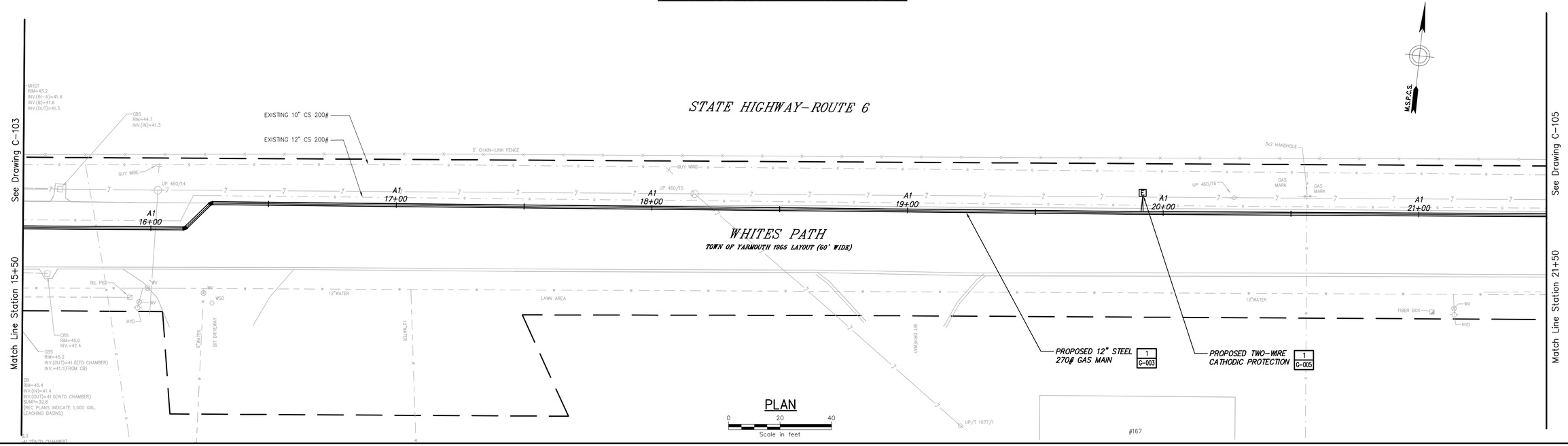
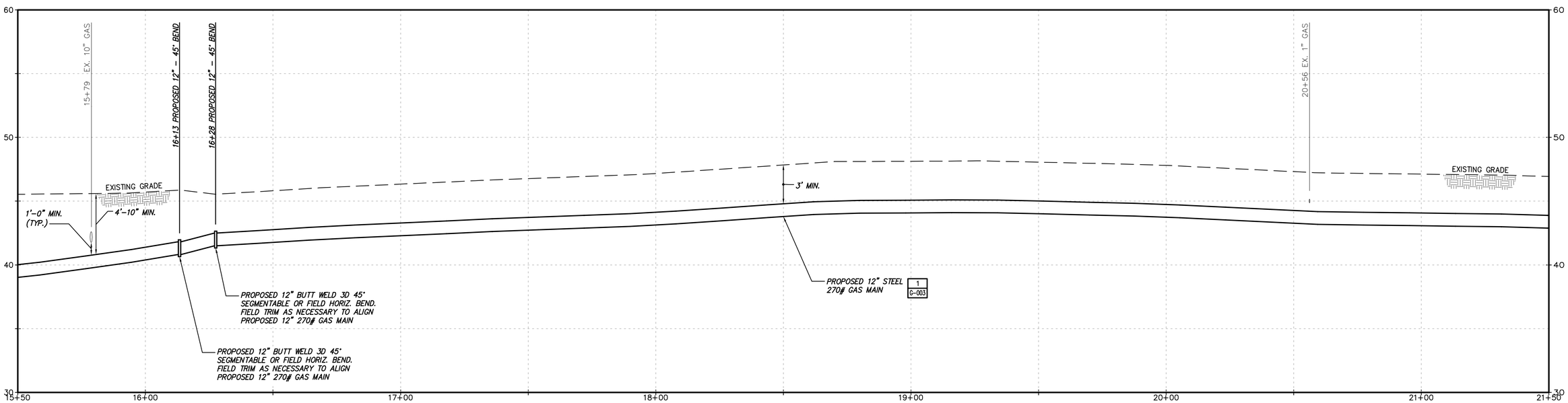
DRAWING NUMBER C-104

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-104-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-104-29847		C-104

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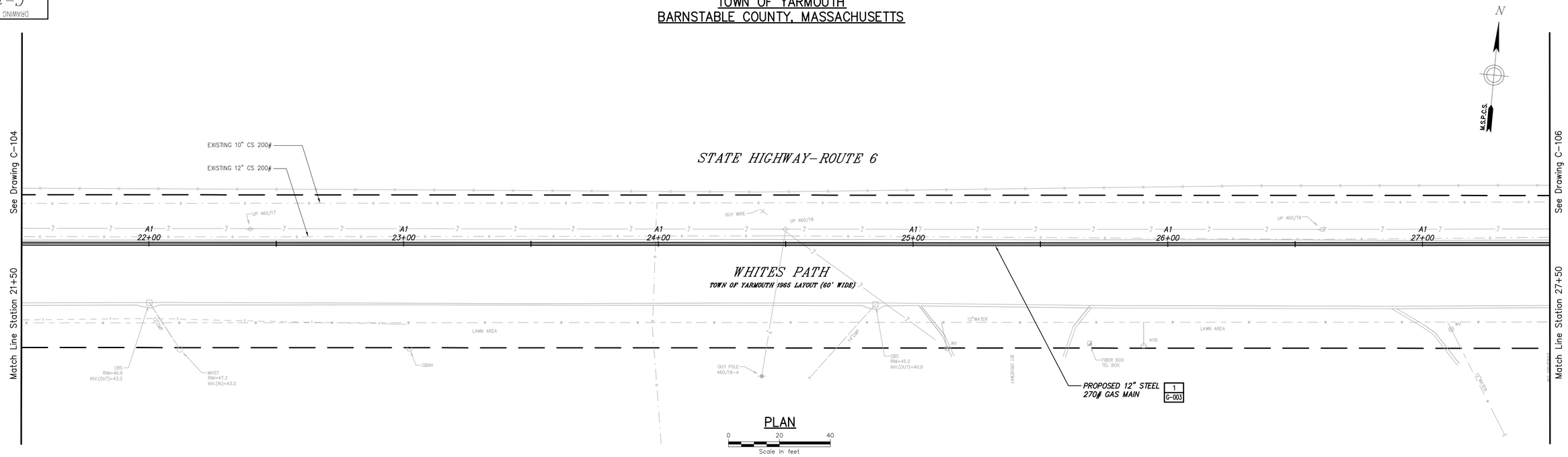
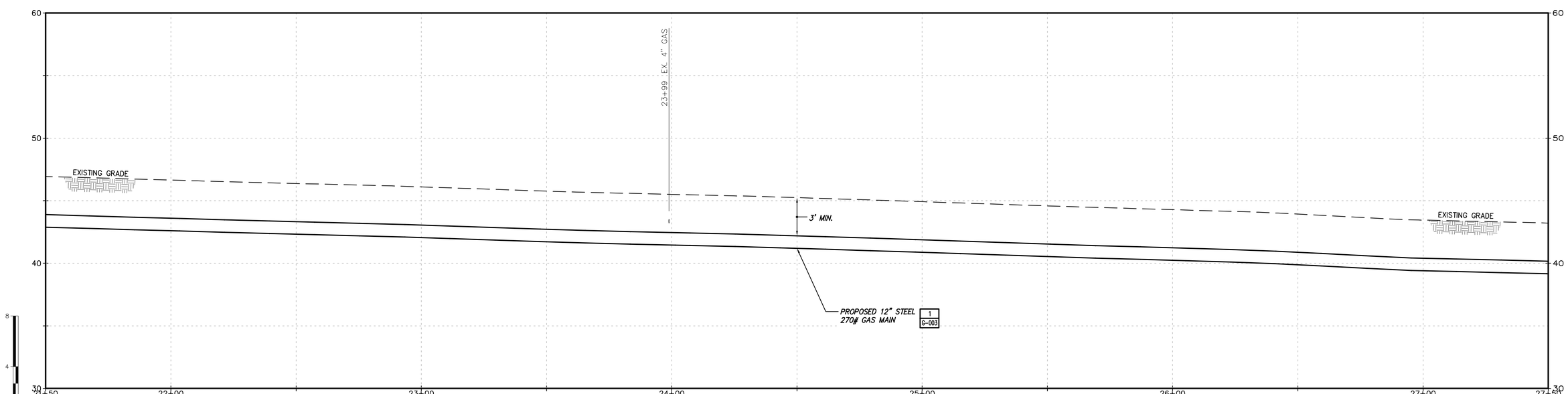
DRAWING NUMBER C-105

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-105-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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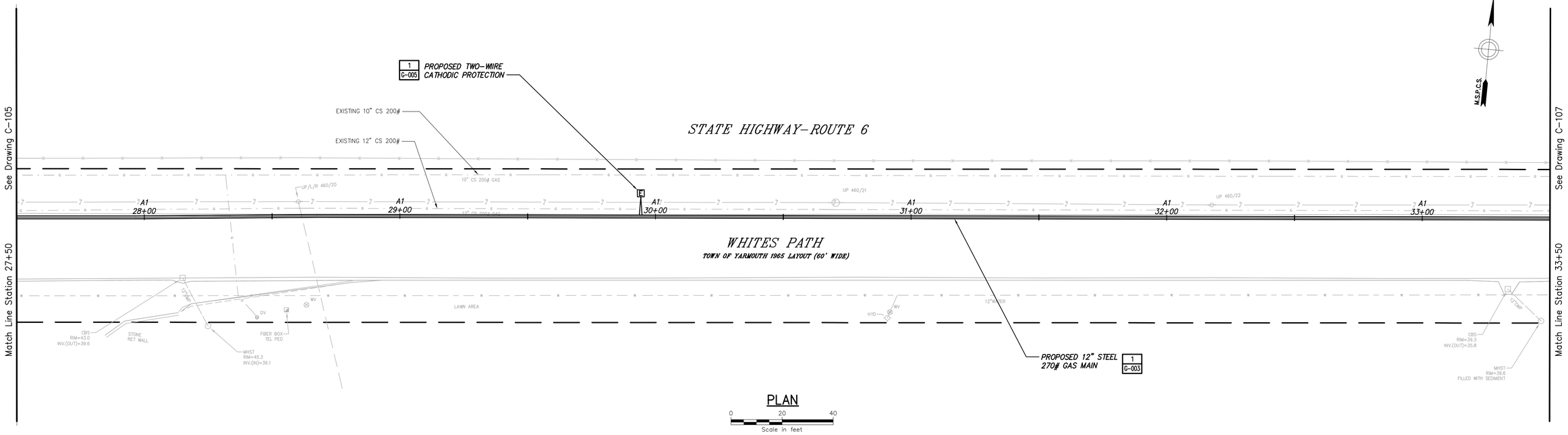
DRAWING NUMBER C-106

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



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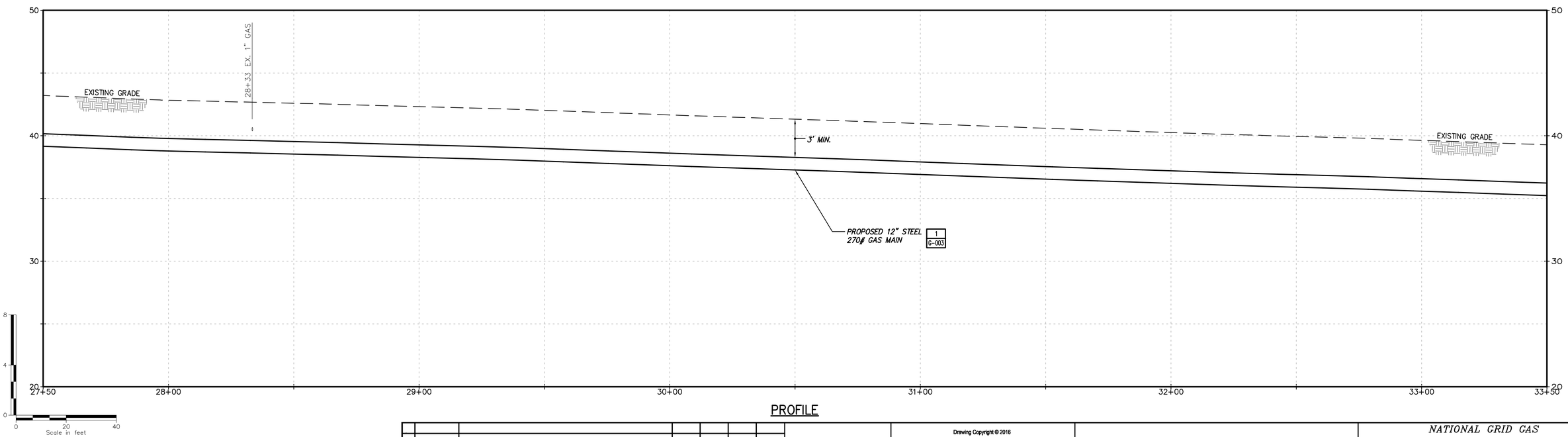

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-106-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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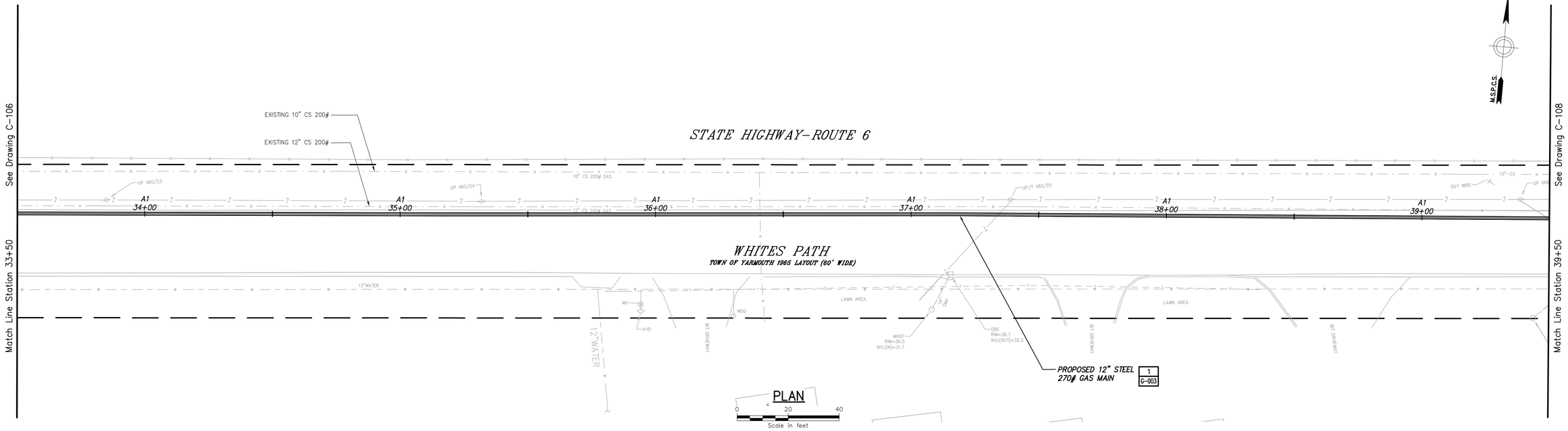
DRAWING NUMBER C-107

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



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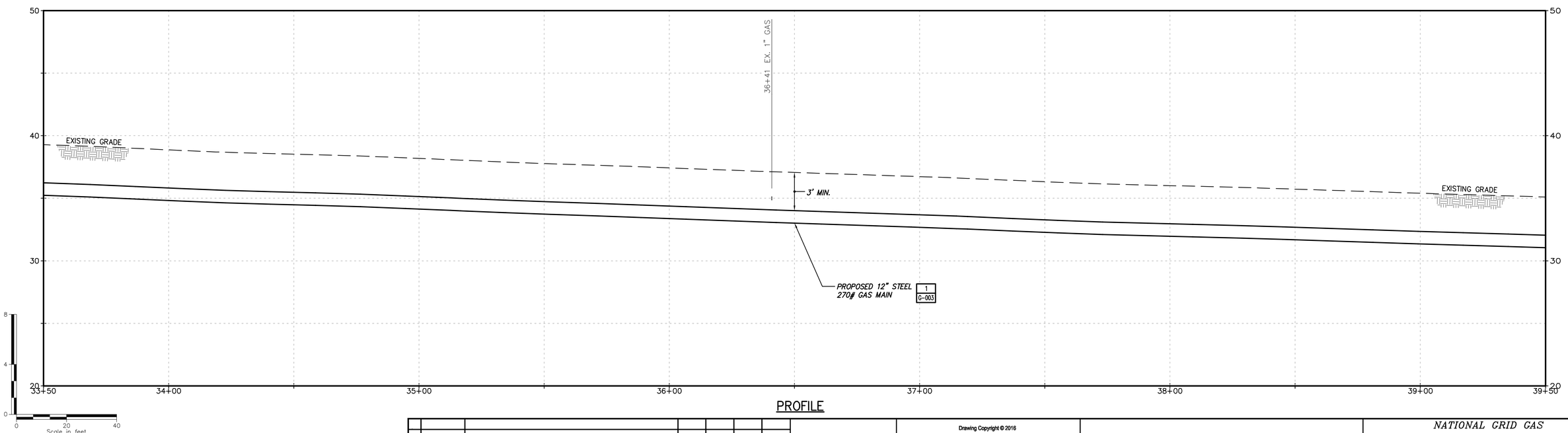

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-107-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-107-29847		C-107

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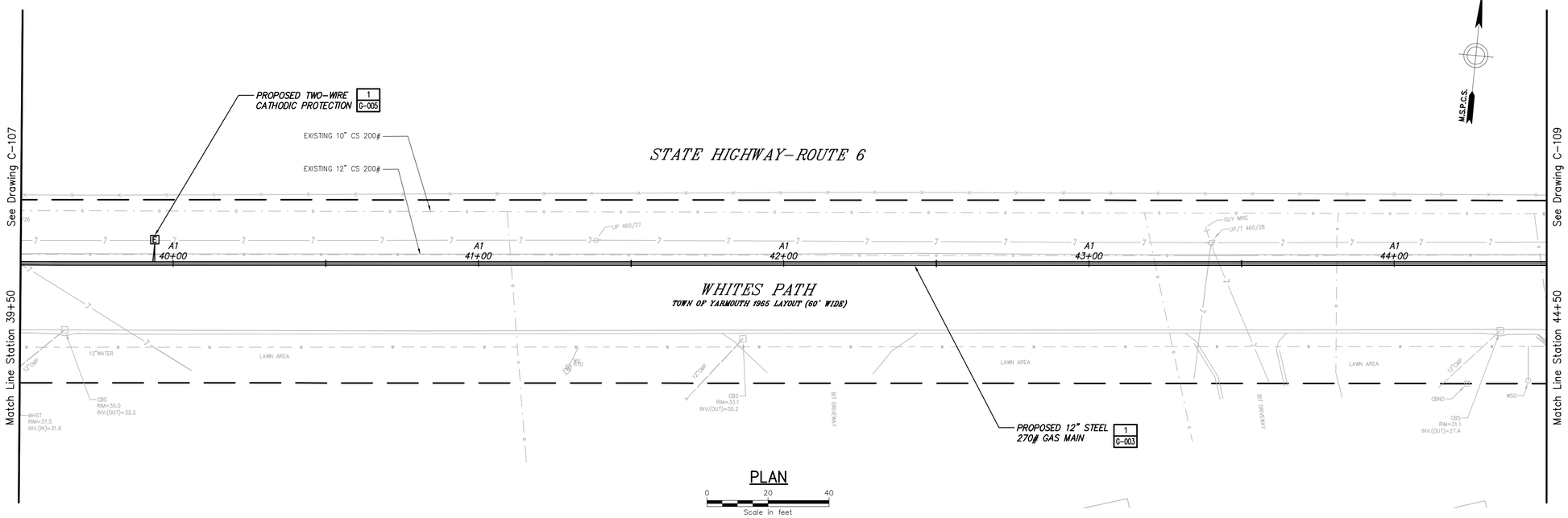
DRAWING NUMBER C-108

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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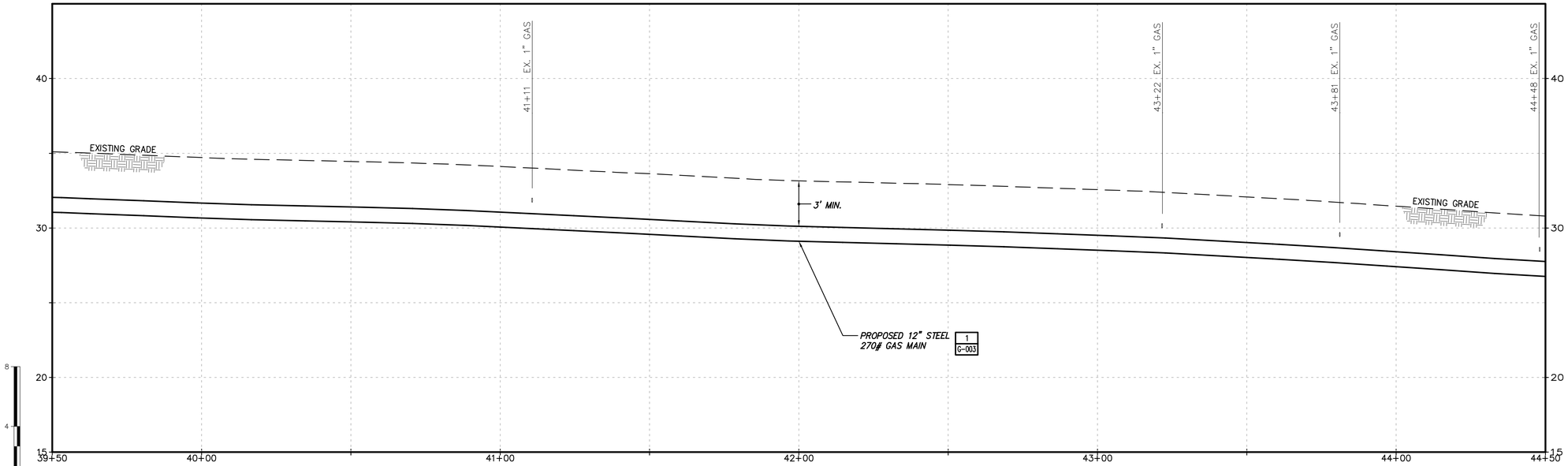
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-108-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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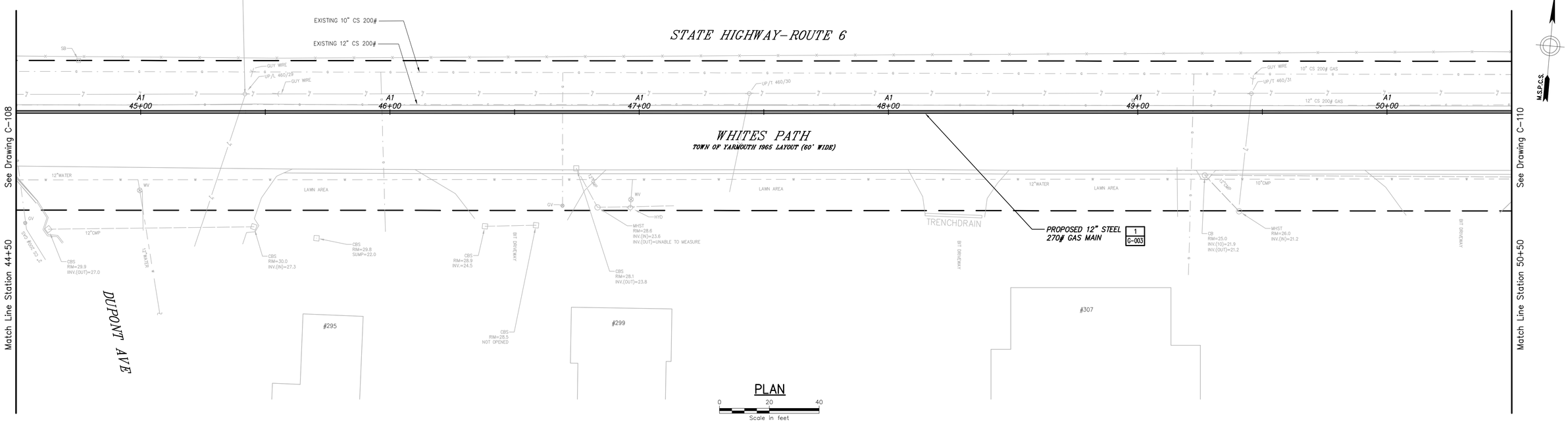
DRAWING NUMBER C-109

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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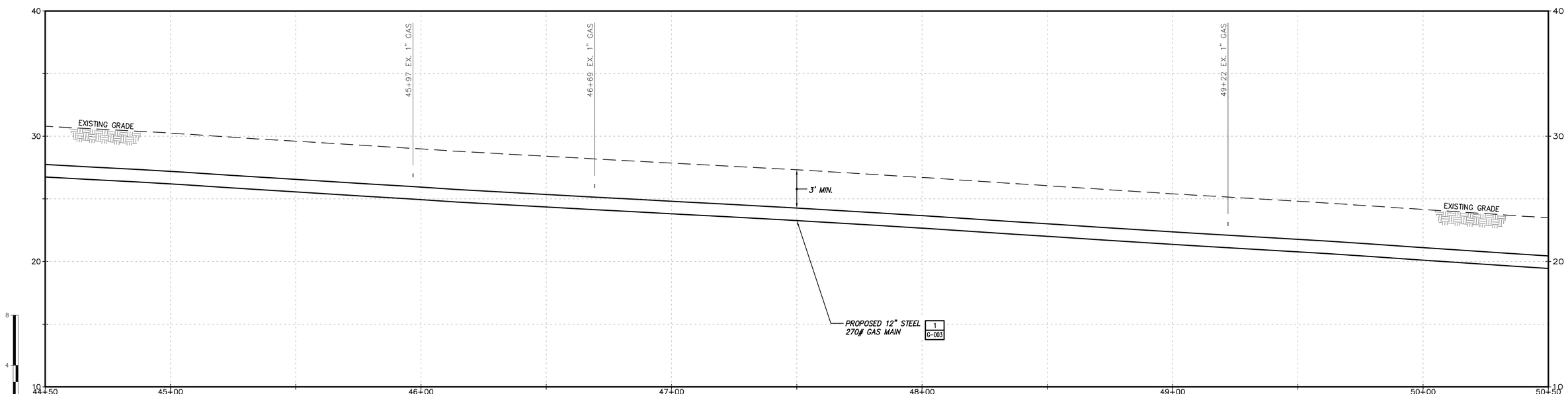
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-109-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-109-29847		C-109

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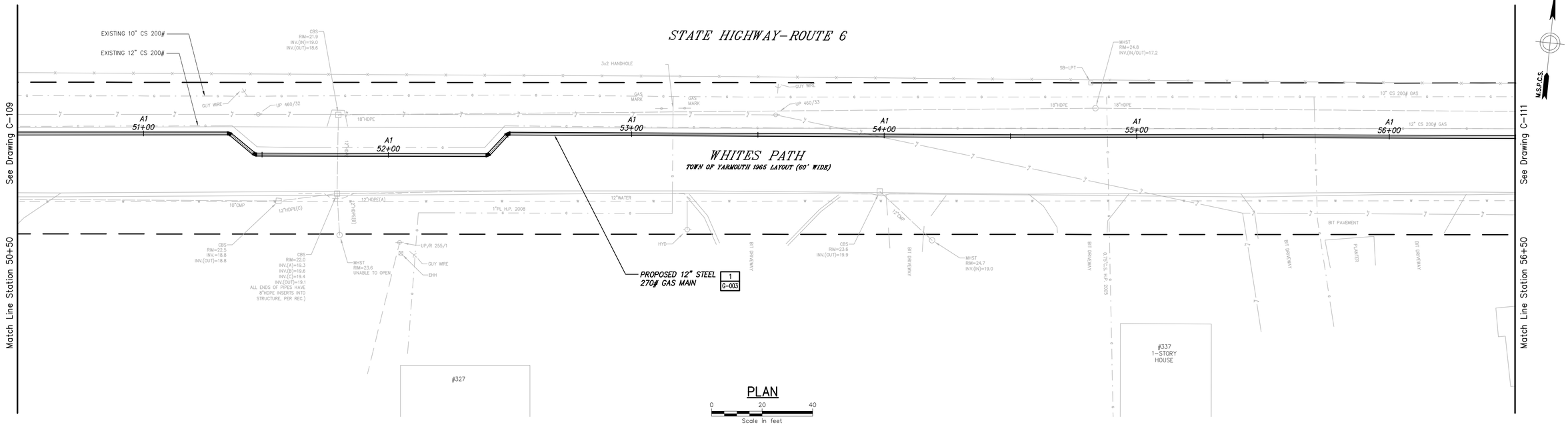
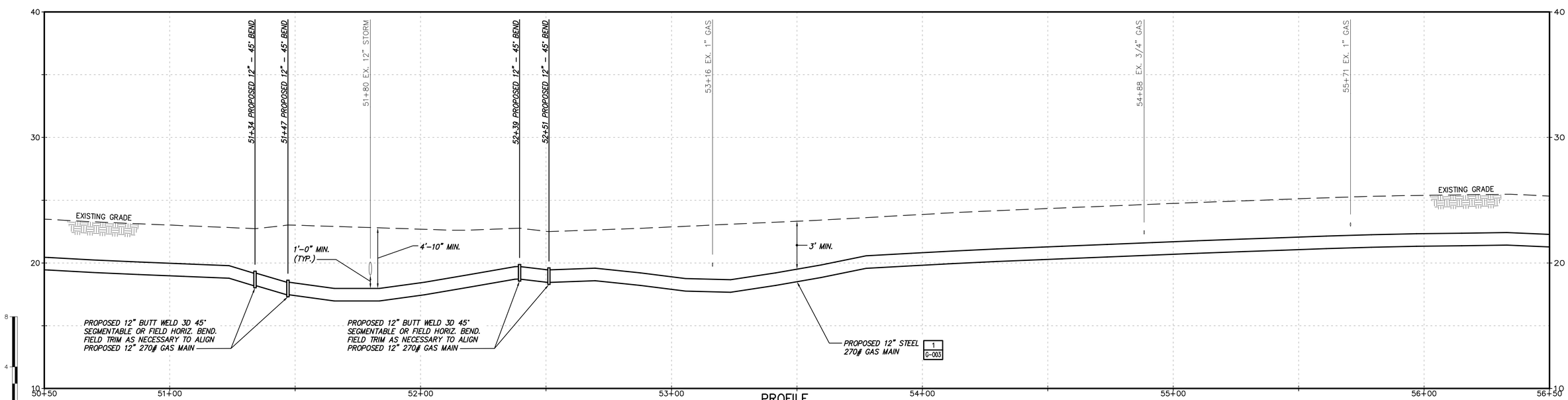
TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-110-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-110-29847		C-110

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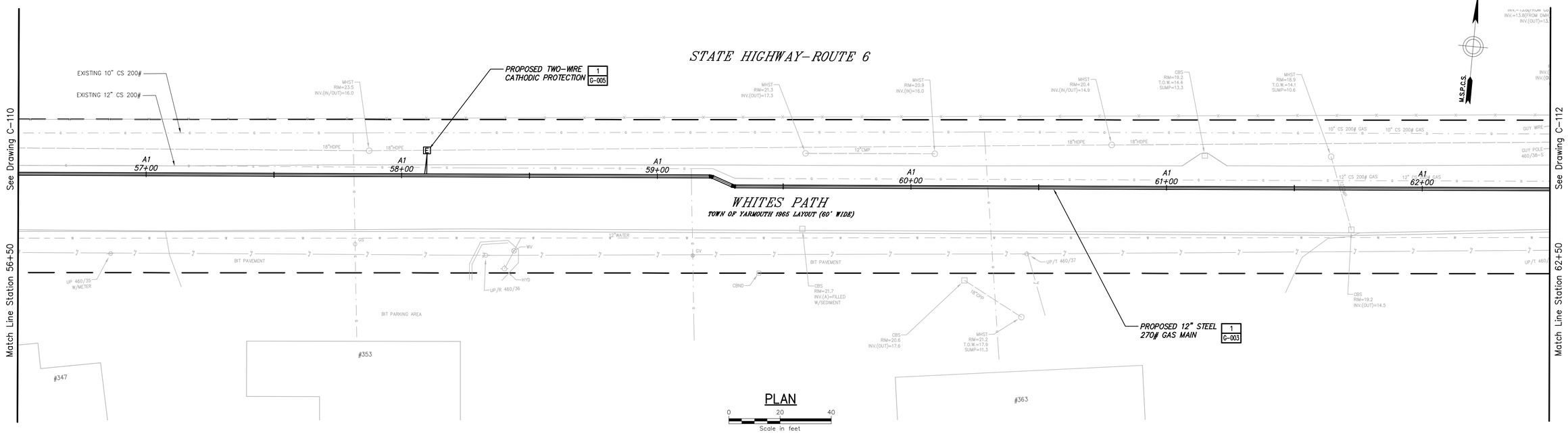
DRAWING NUMBER C-111

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



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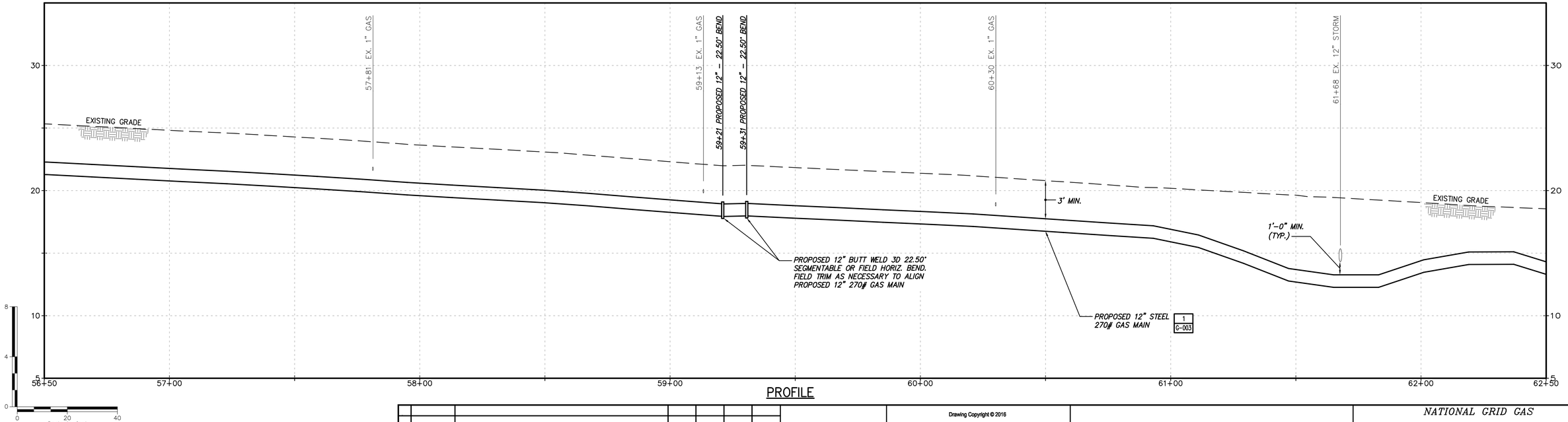

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-111-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-111-29847		C-111

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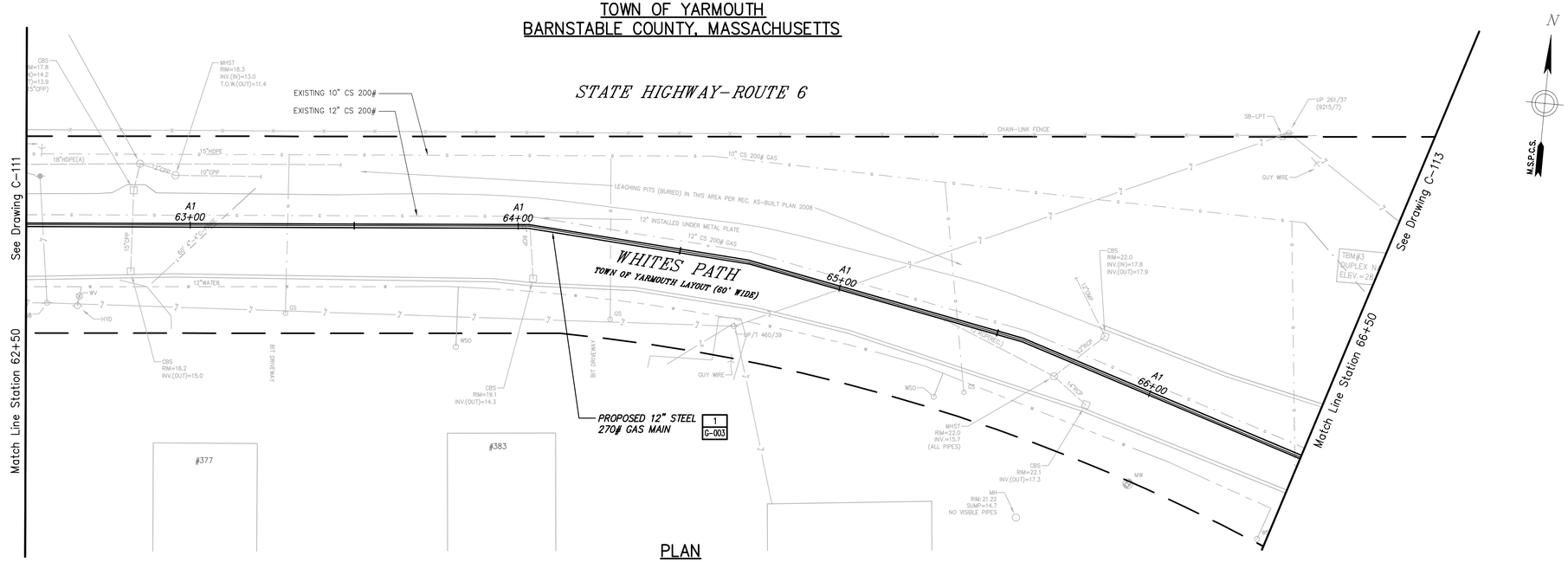
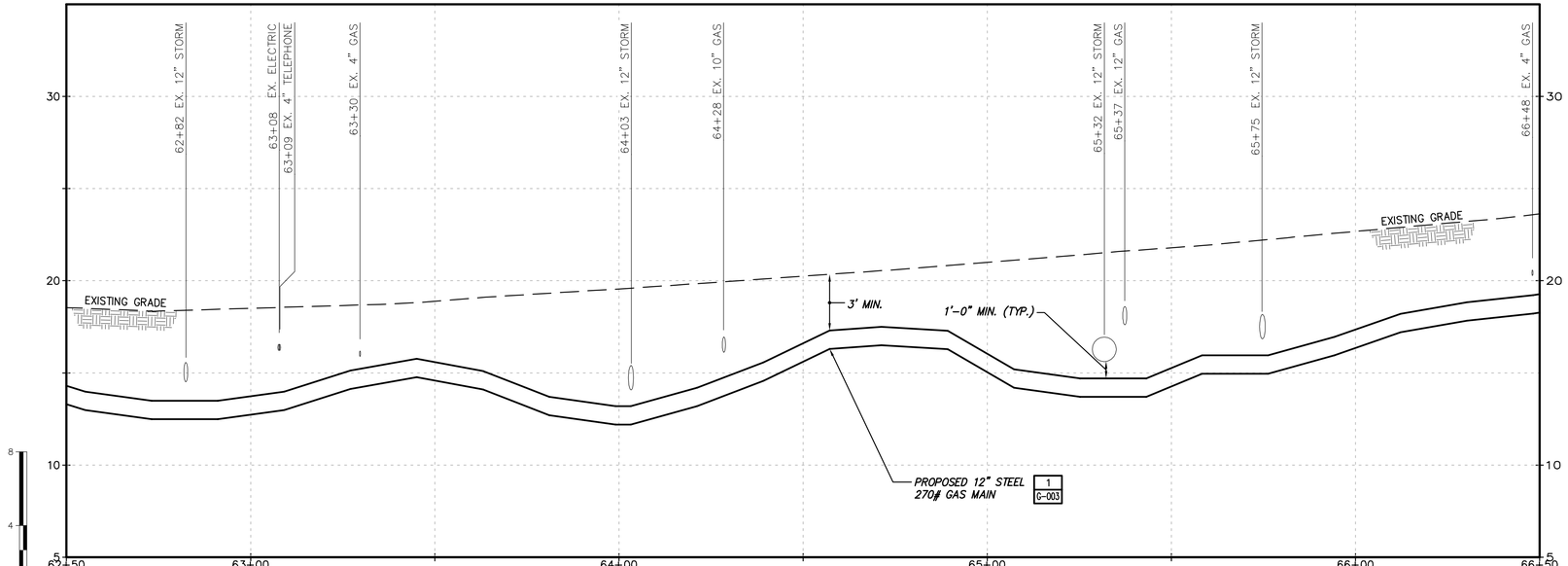
DRAWING NUMBER
C-112

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-112-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-112-29847		C-112

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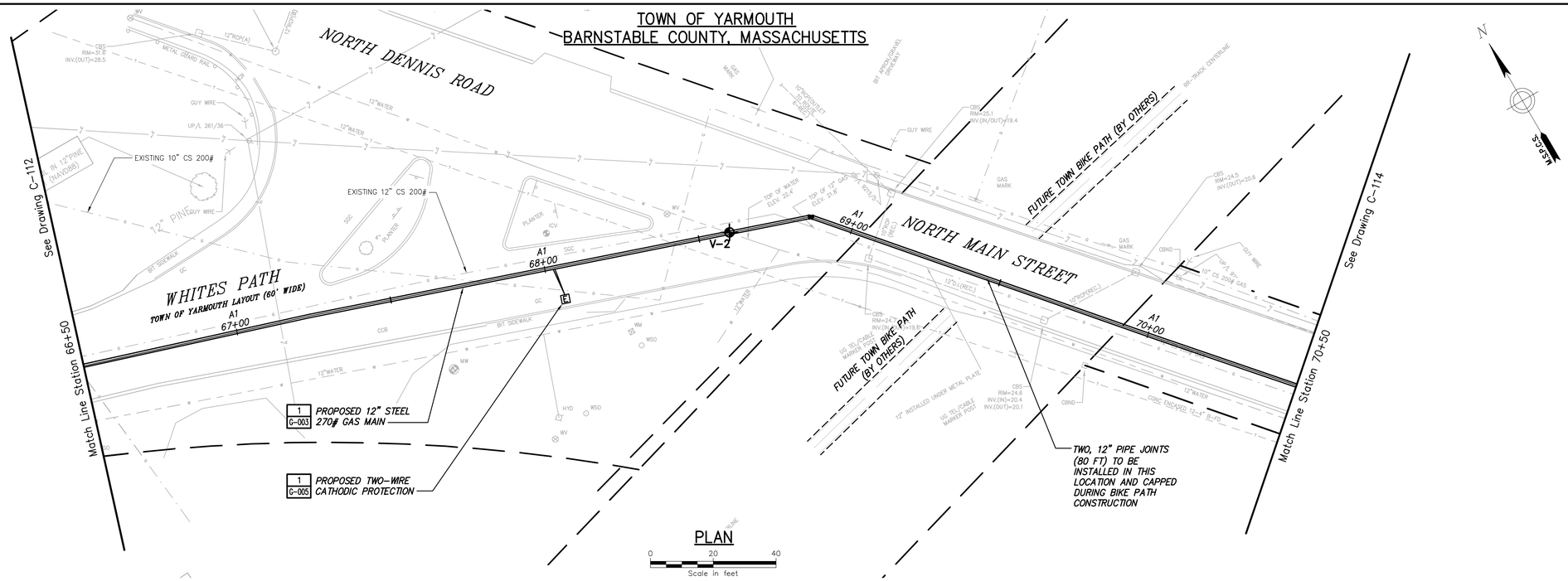
C-113

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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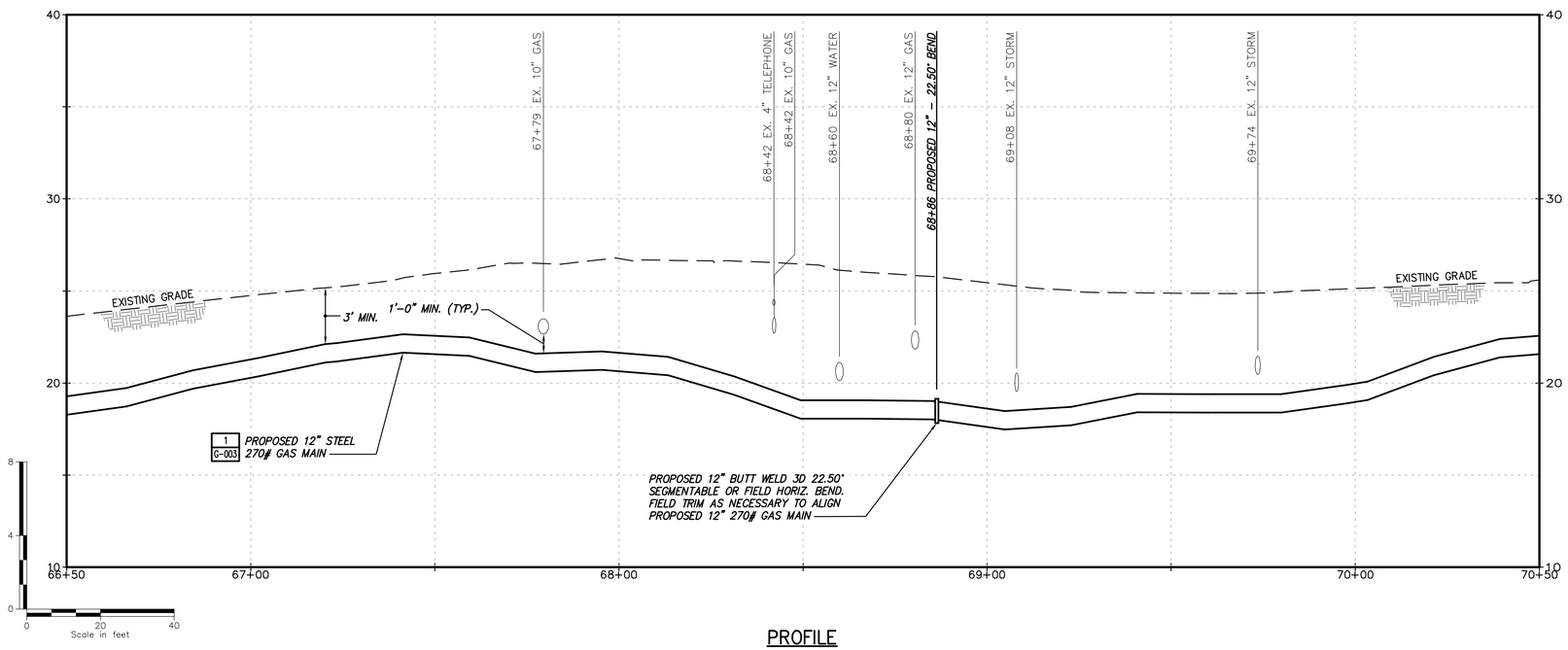
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-113-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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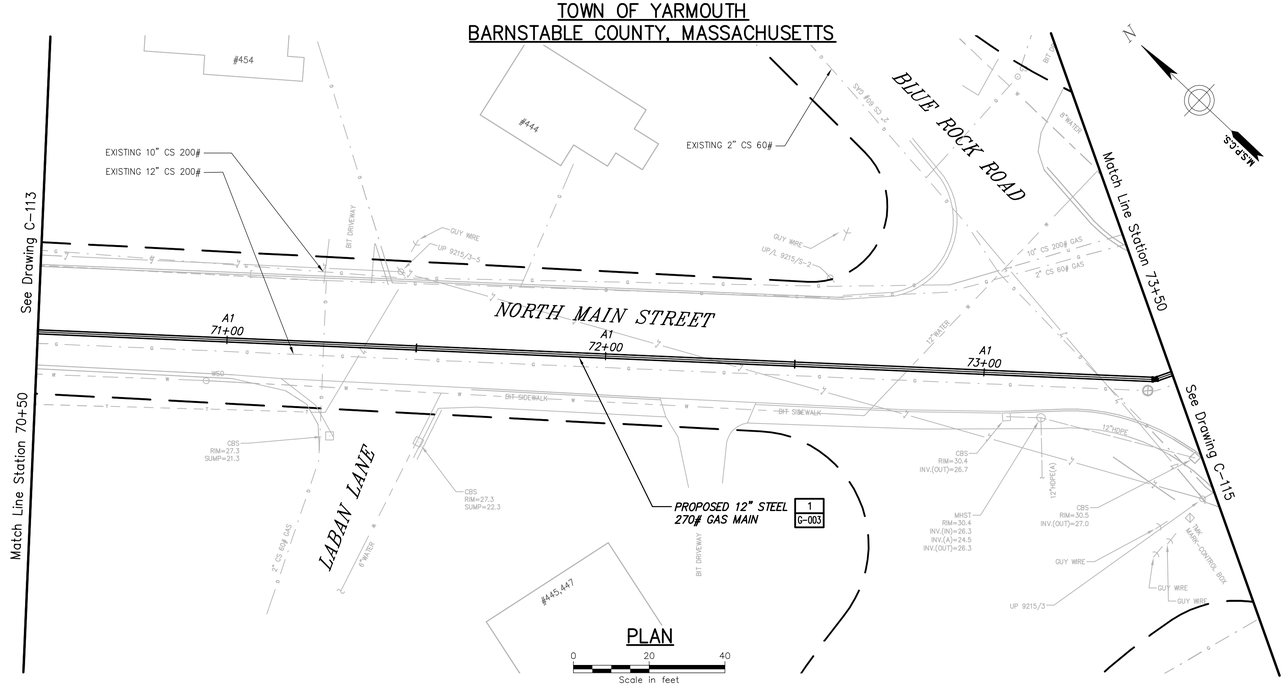
C-114

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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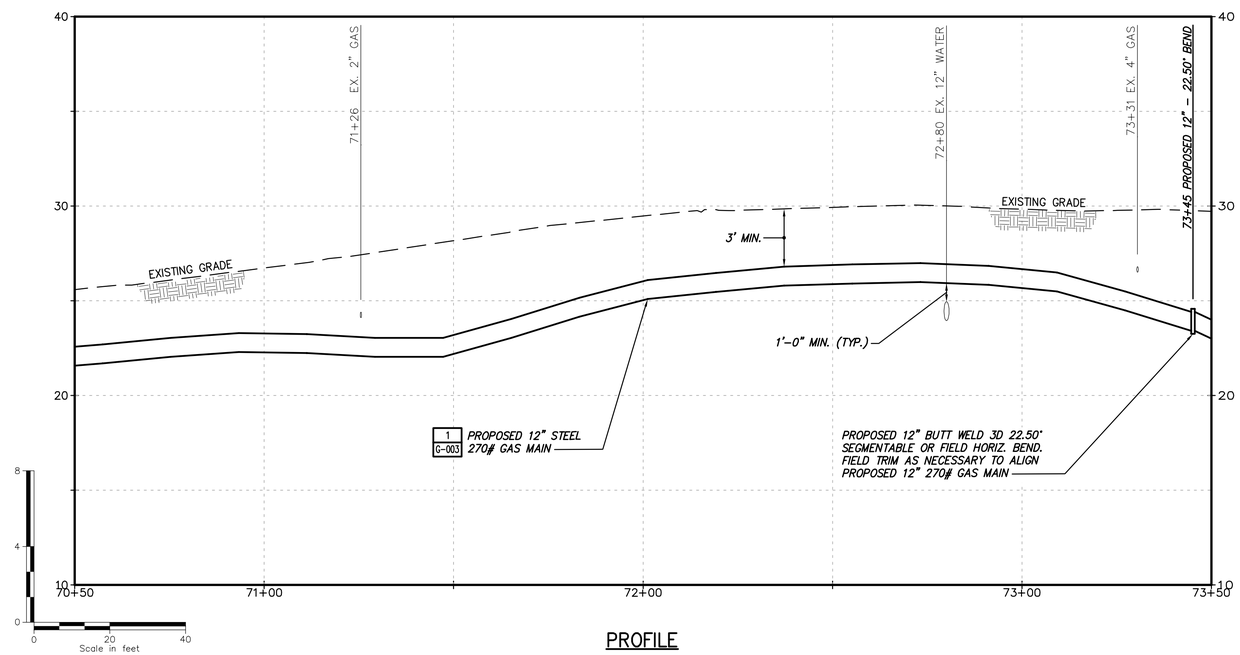

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-114-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-114-29847		C-114

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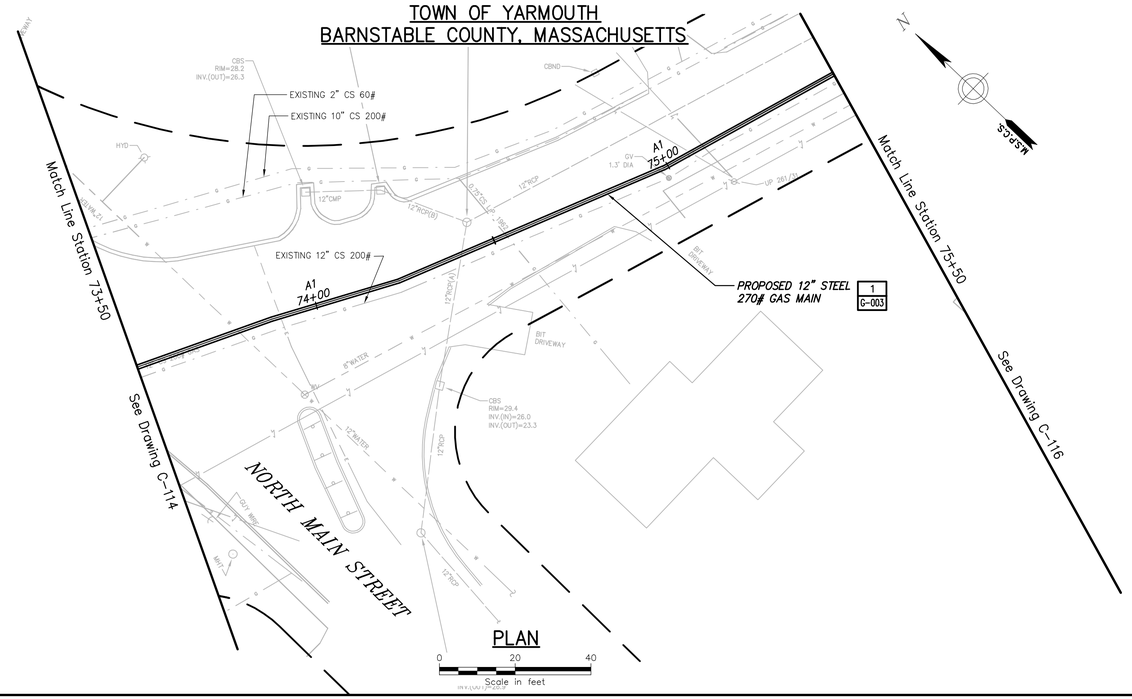
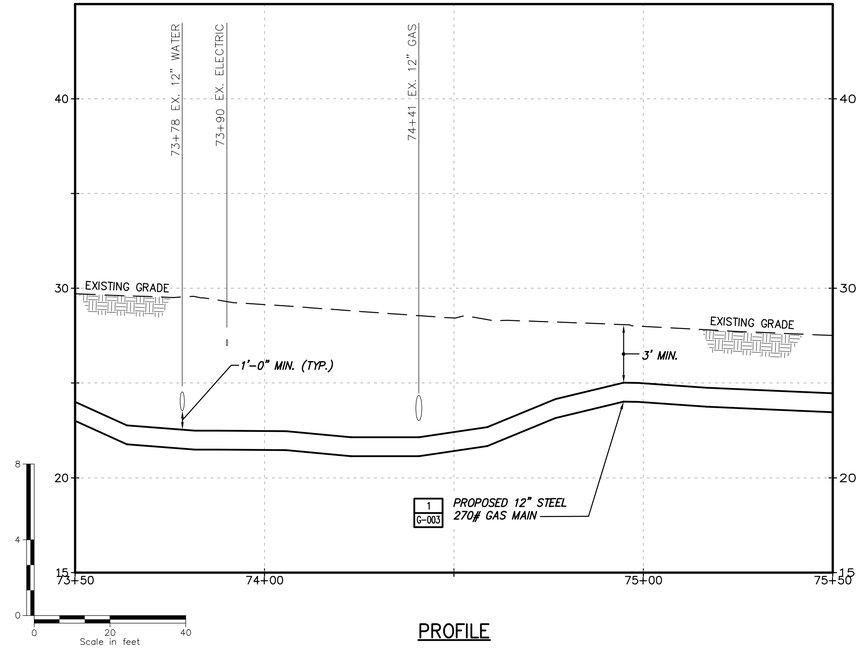
DRAWING NUMBER
C-115

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-115-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-115-29847		C-115

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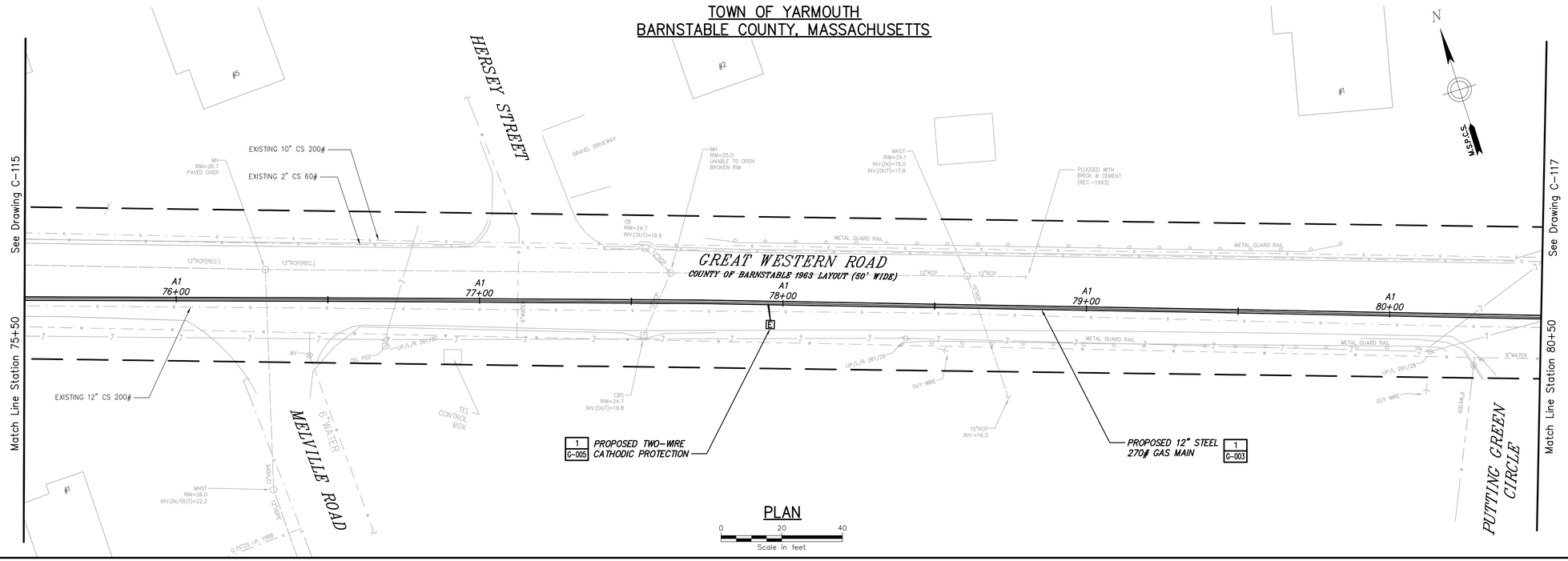
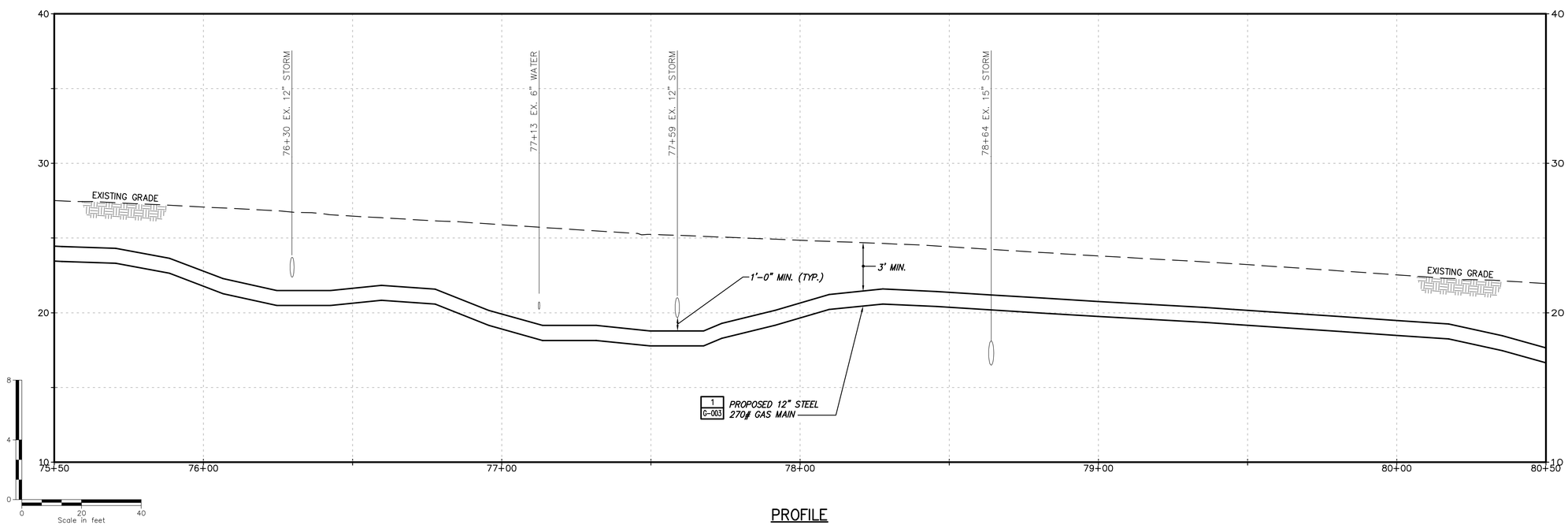
DRAWING NUMBER C-116

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-116-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-116-29847	SEQUENCE No.	DRAWING NUMBER C-116
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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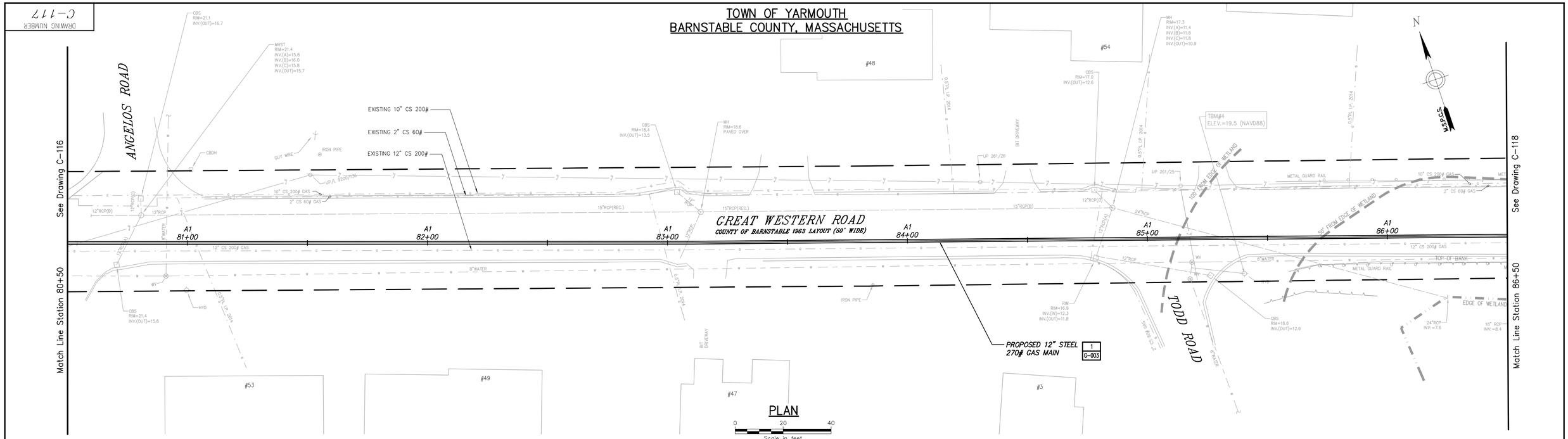
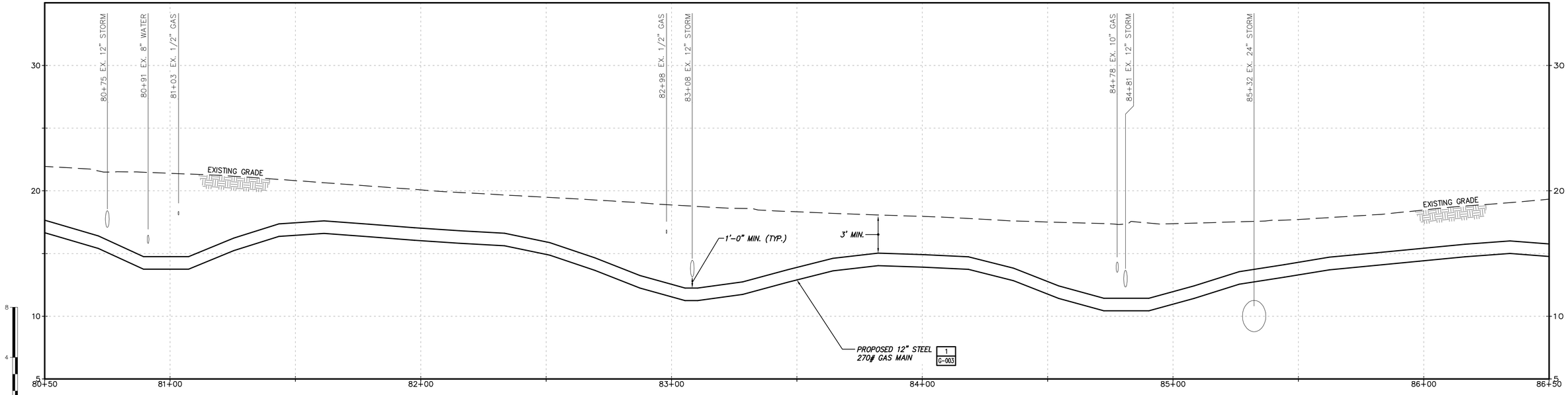
DRAWING NUMBER C-117

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-117-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-117-29847		C-117

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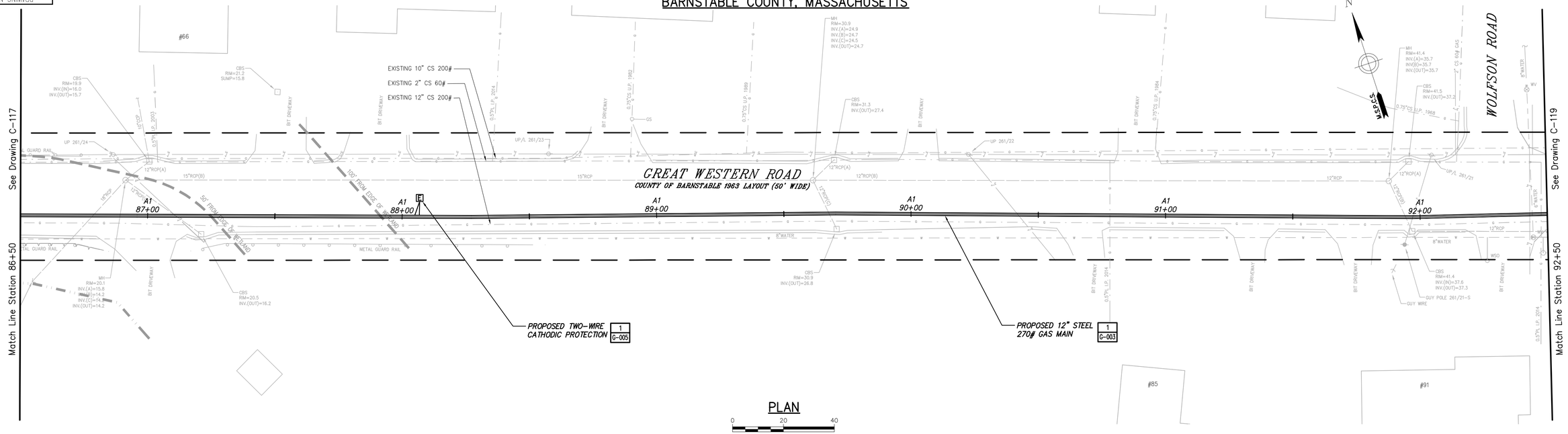
DRAWING NUMBER C-118

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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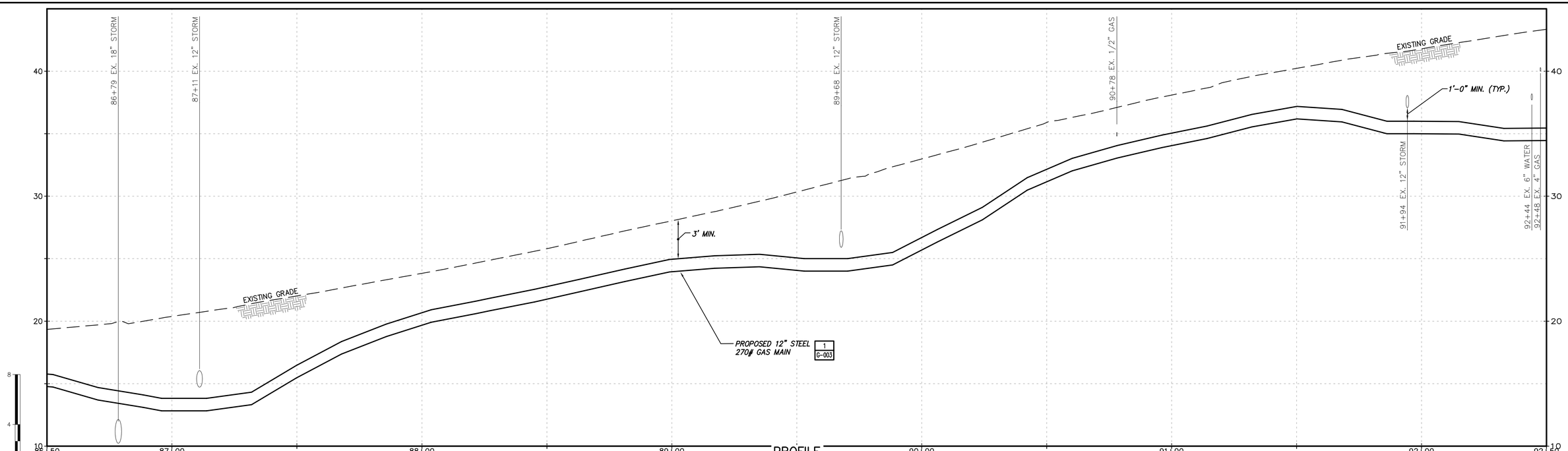
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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CONSTRUCTION DRAWINGS

C-118-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-118-29847	SEQUENCE No.	DRAWING NUMBER C-118
Chkd. BCK	Design Engr. CEW	Design Supv. JEO			

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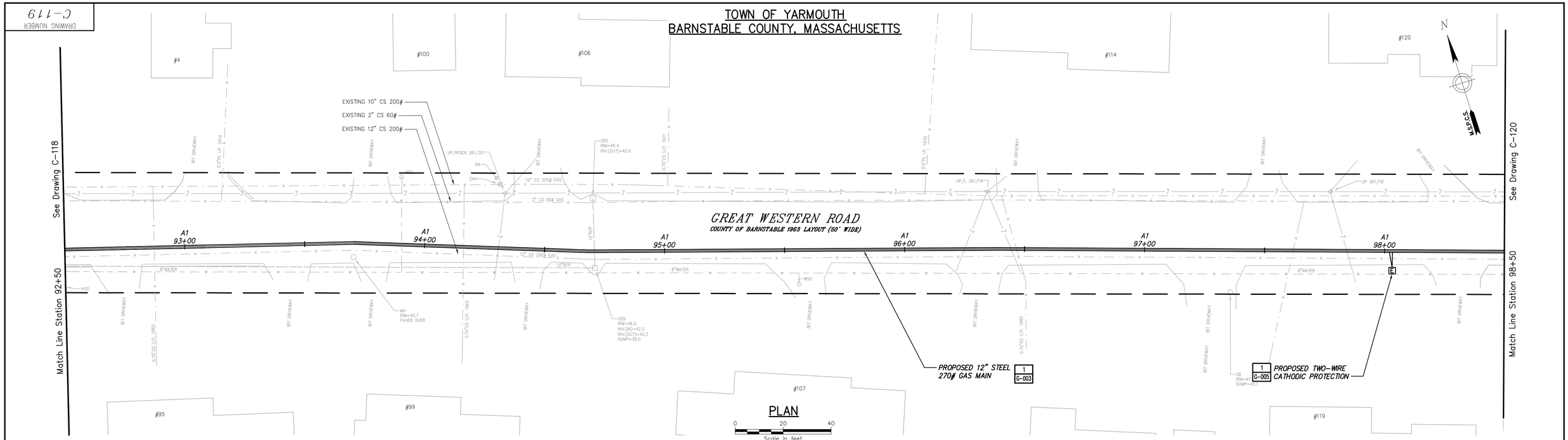
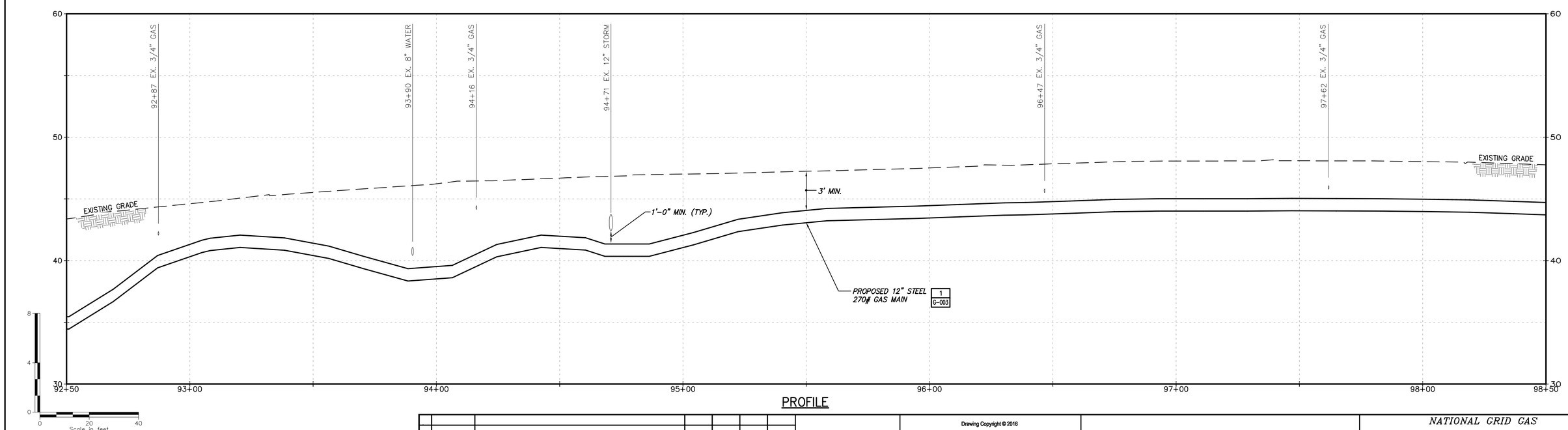
DRAWING NUMBER C-119

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-119-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-119-29847		C-119

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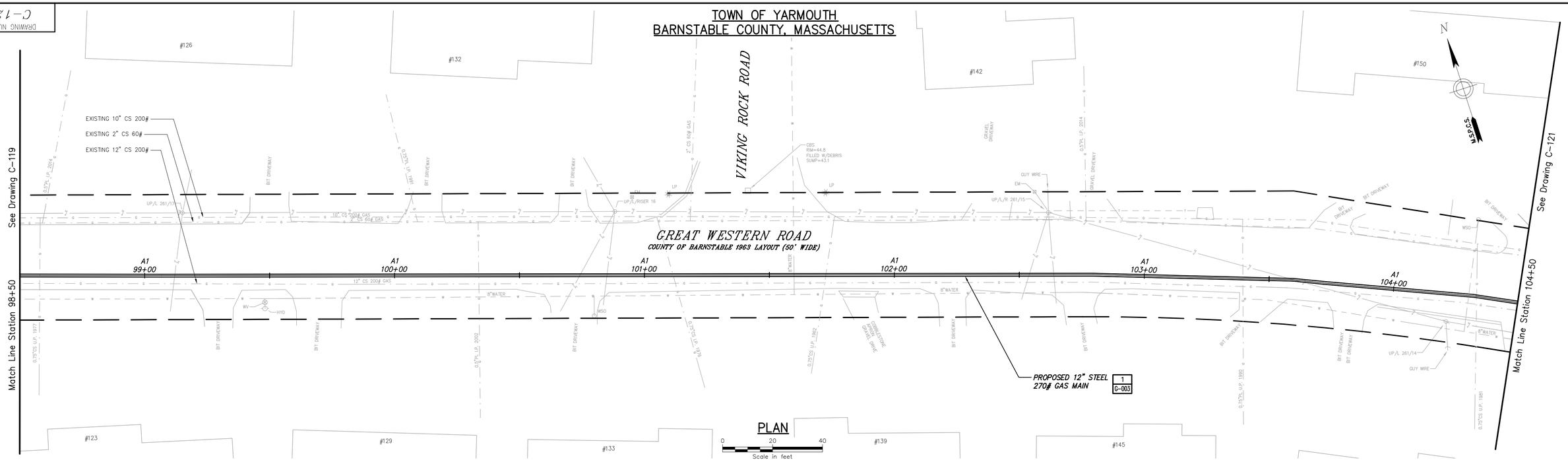
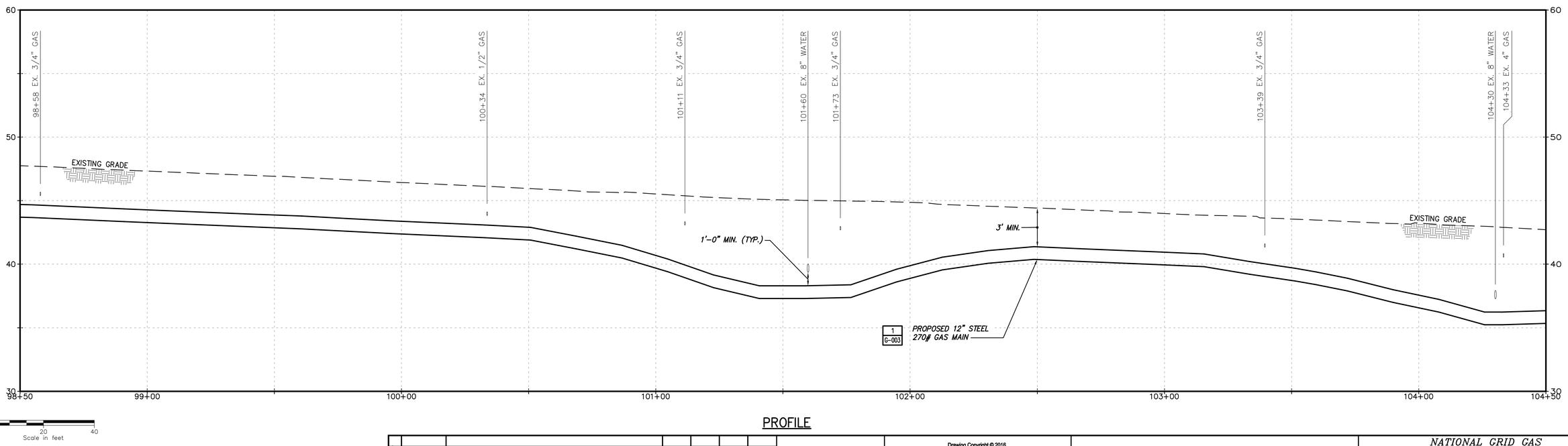
DRAWING NUMBER C-120

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-120-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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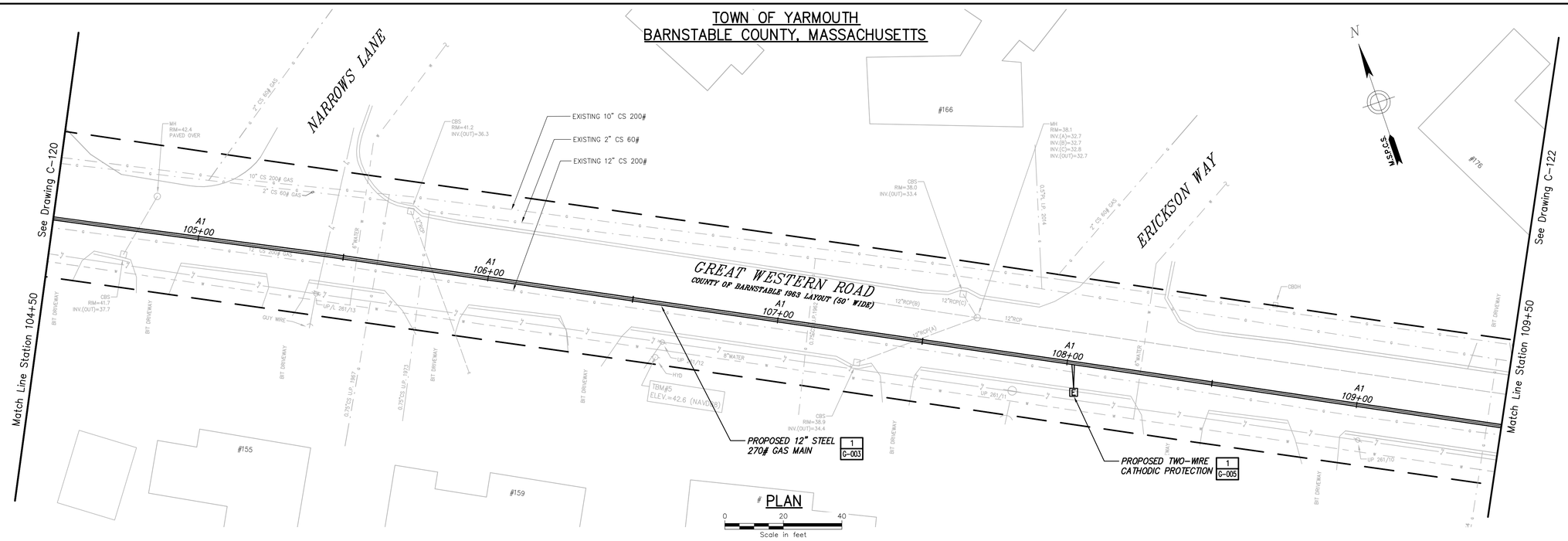
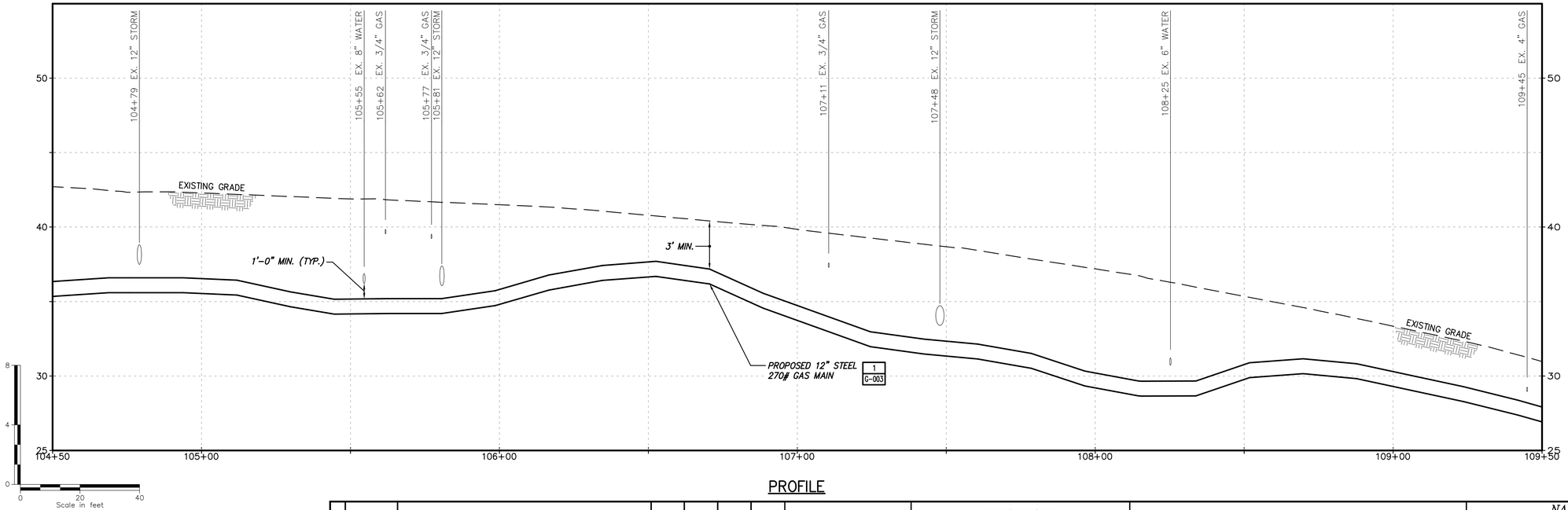
DRAWING NUMBER C-121

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



PROFILE

Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-121-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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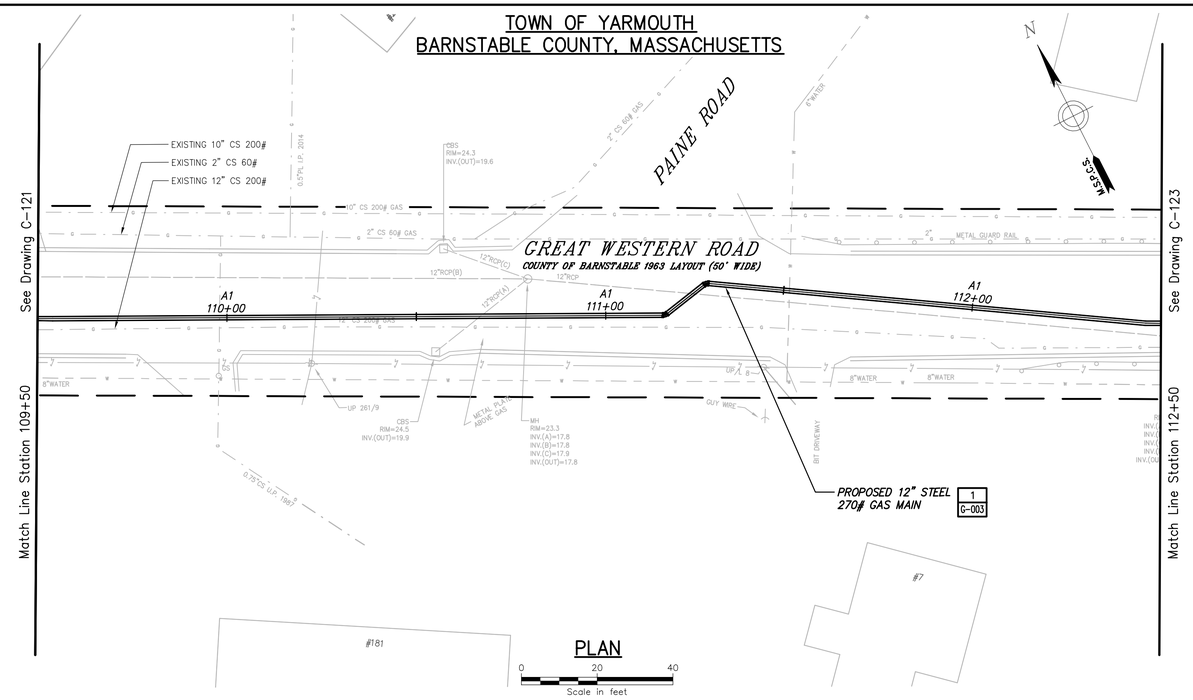
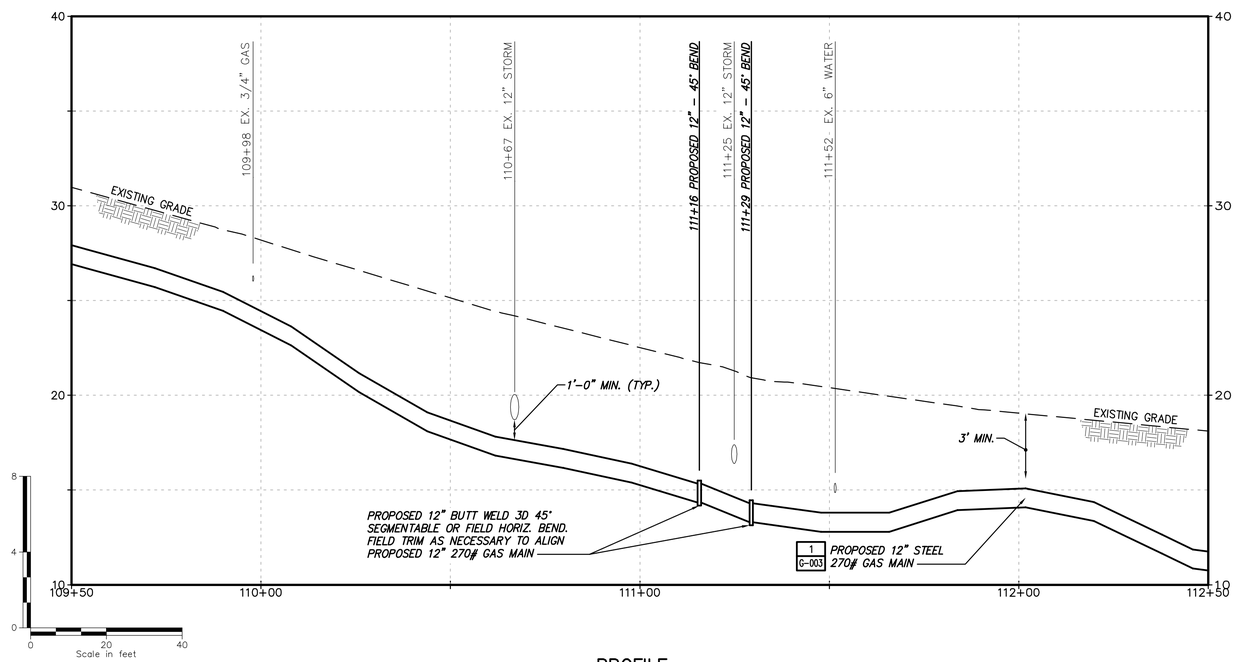
DRAWING NUMBER
C-122

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-122-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-122-29847		C-122

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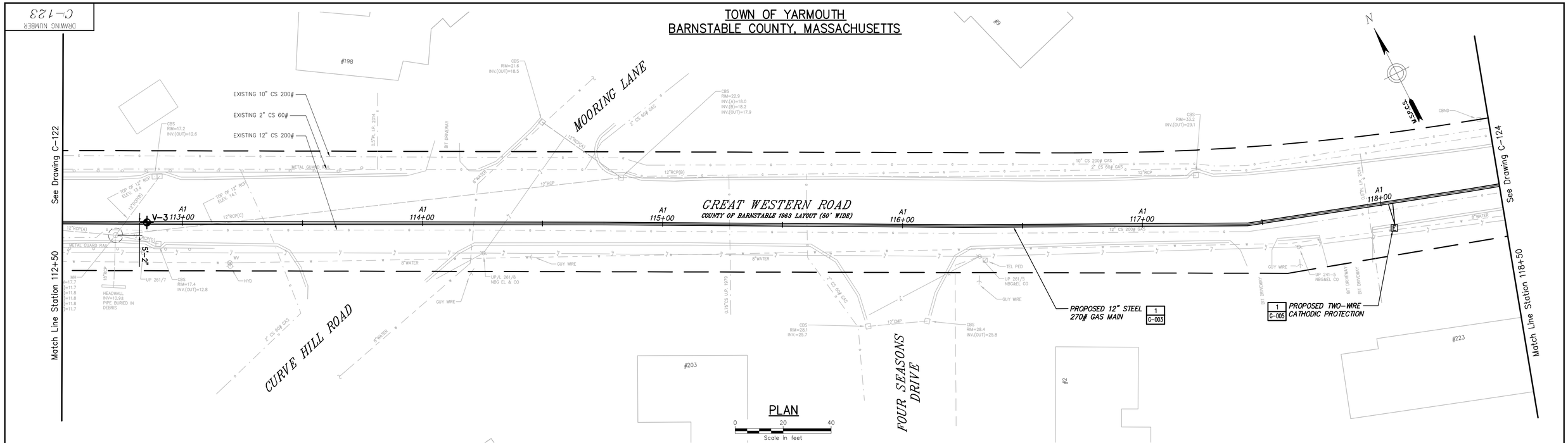
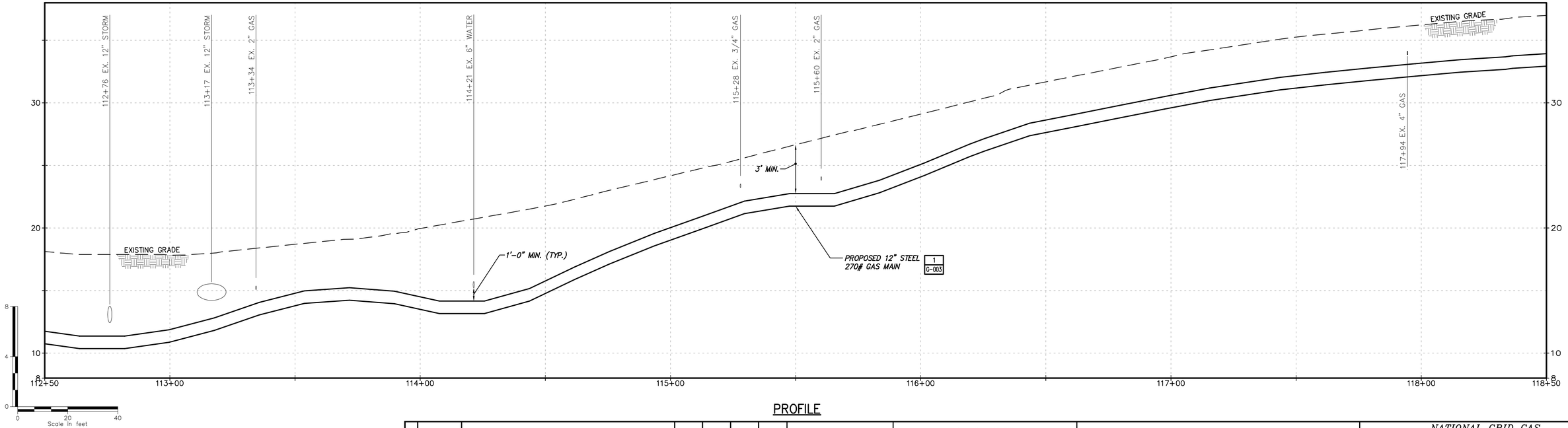
DRAWING NUMBER C-123

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-123-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-123-29847		C-123

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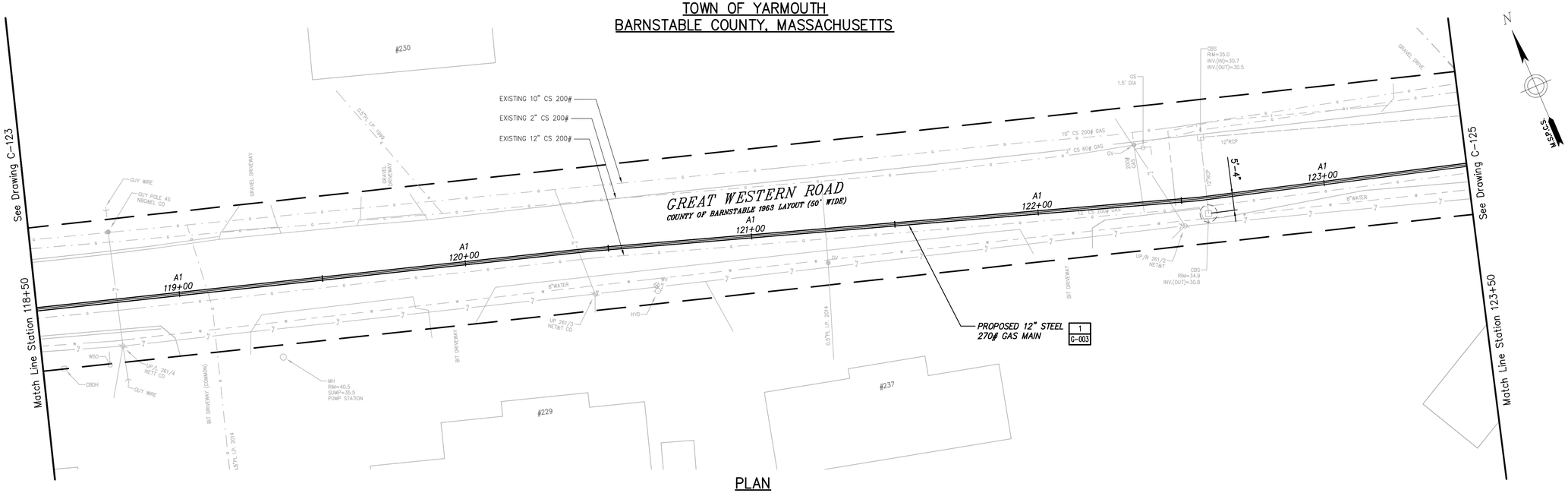
DRAWING NUMBER
C-124

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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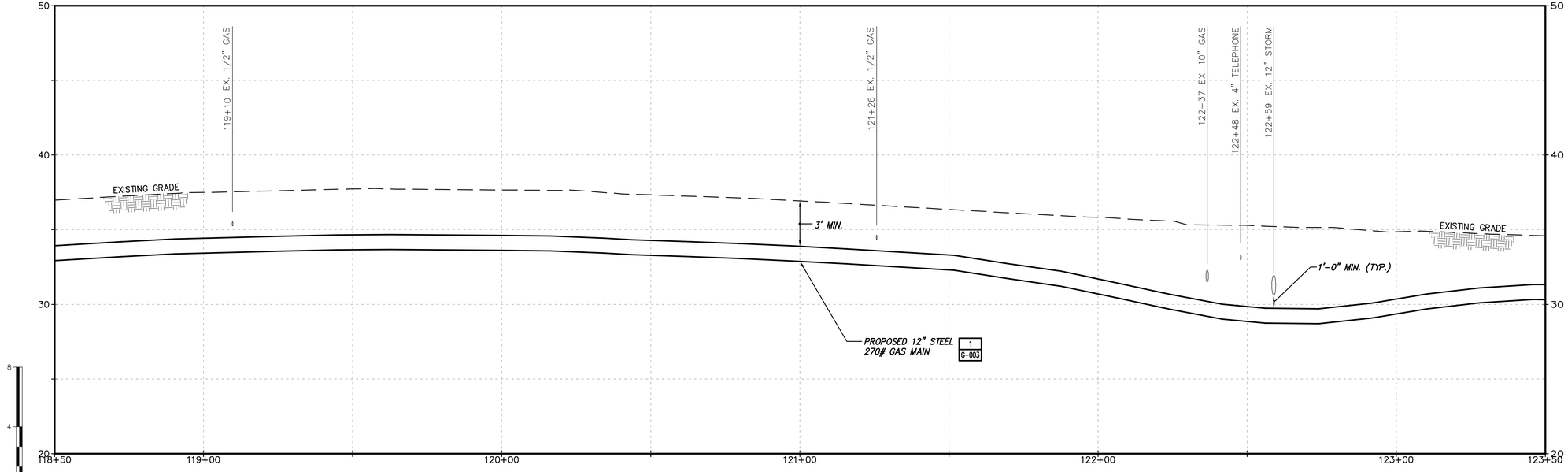
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-124-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-124-29847		C-124

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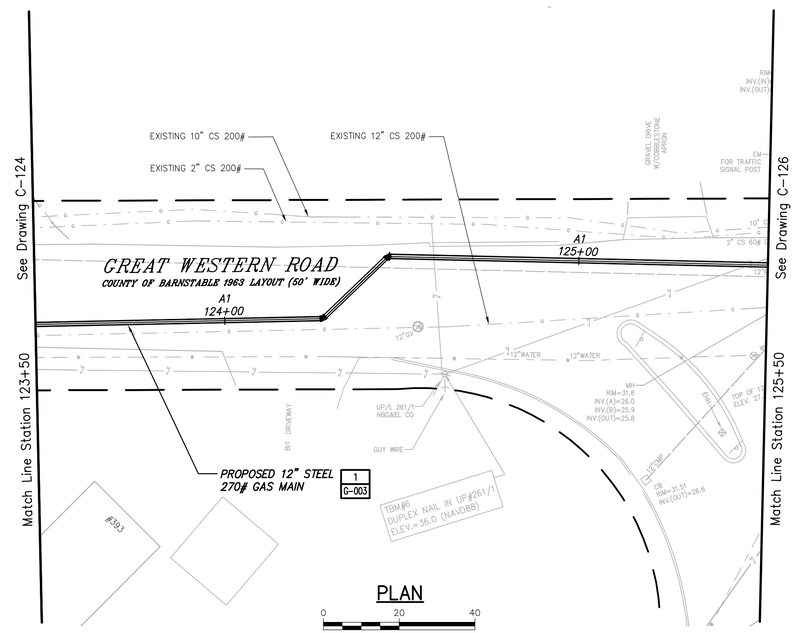
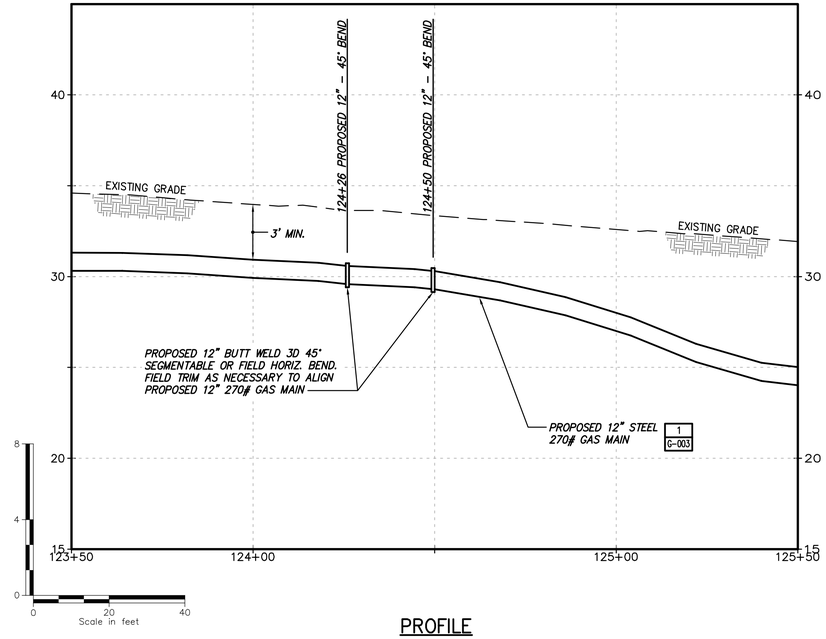
DRAWING NUMBER
C-125

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. CEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-125-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-125-29847		C-125

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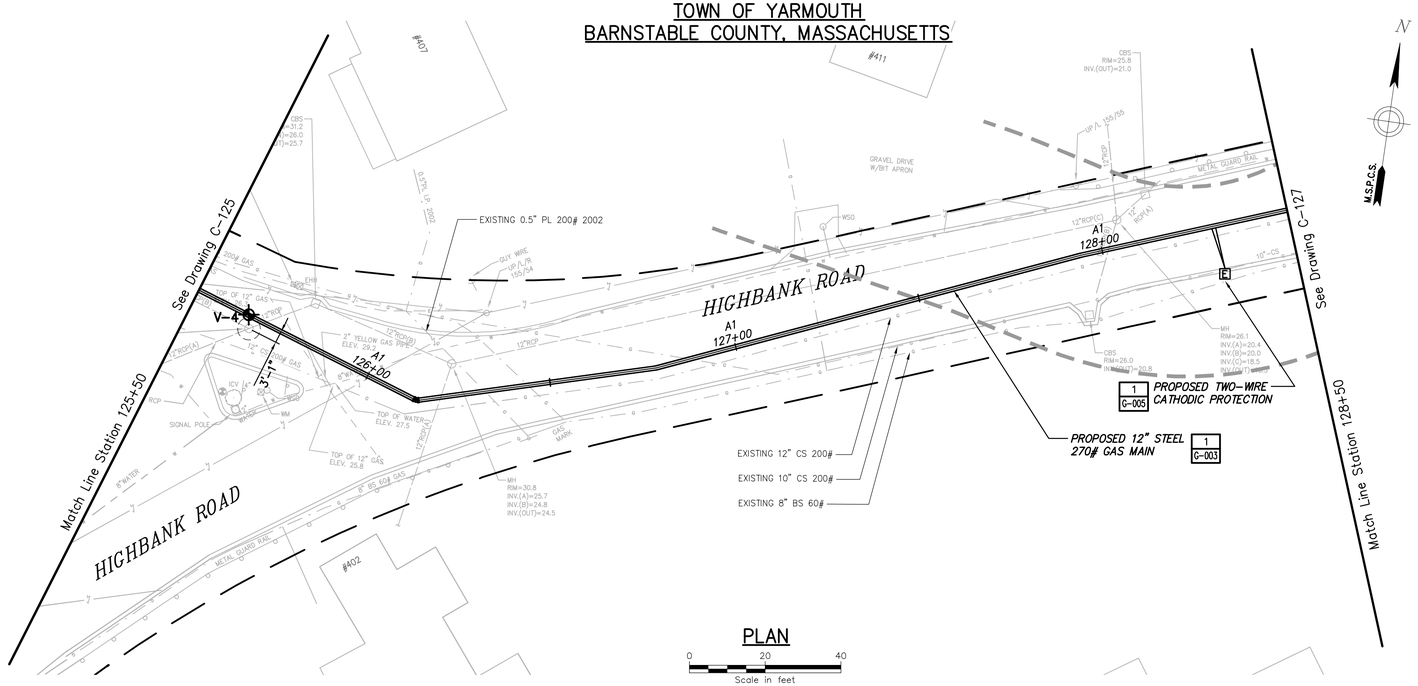
DRAWING NUMBER
C-126

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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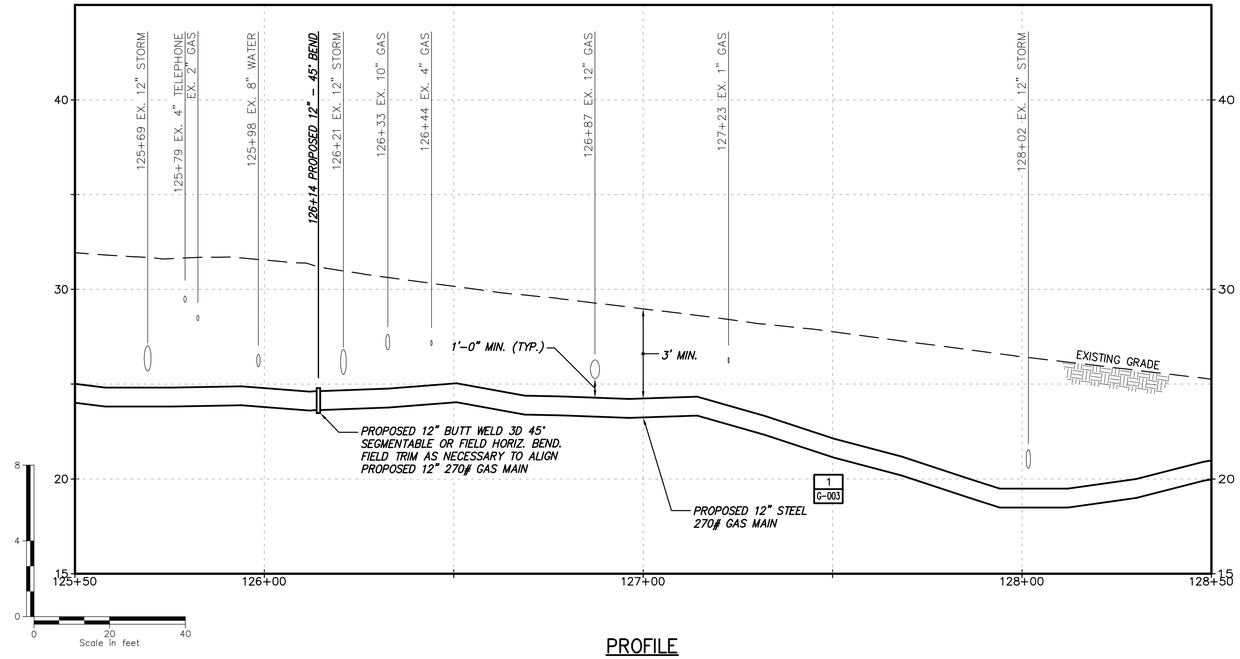
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-126-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-126-29847		C-126

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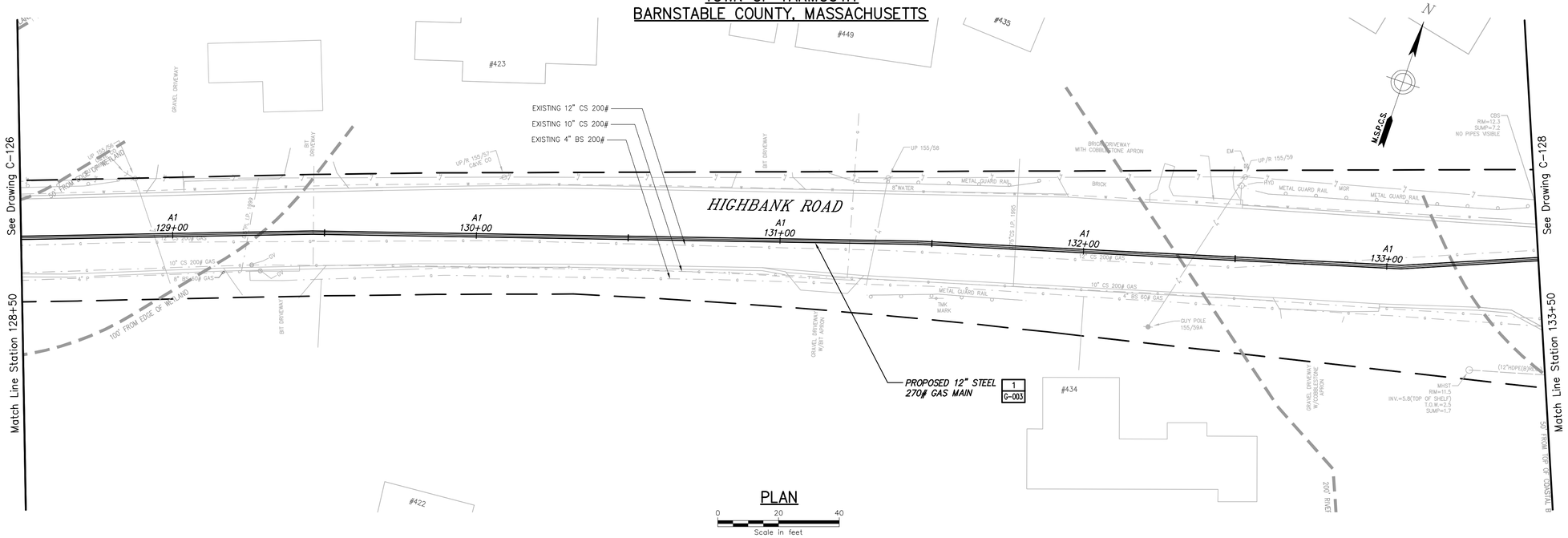
DRAWING NUMBER
C-127

TOWN OF YARMOUTH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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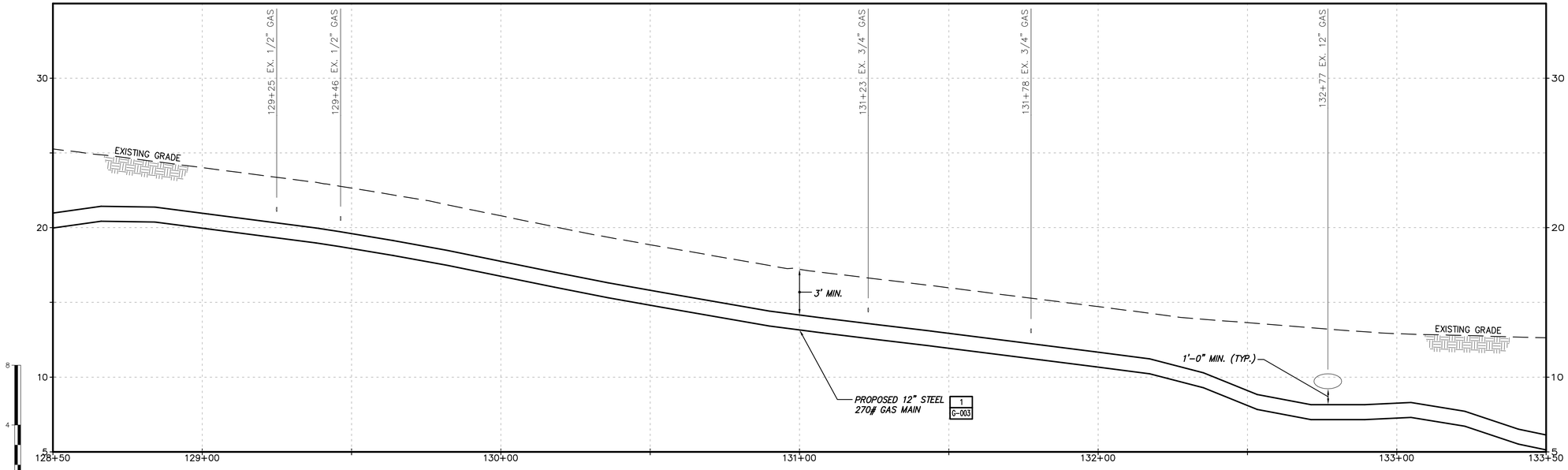
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-127-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-127-29847		C-127

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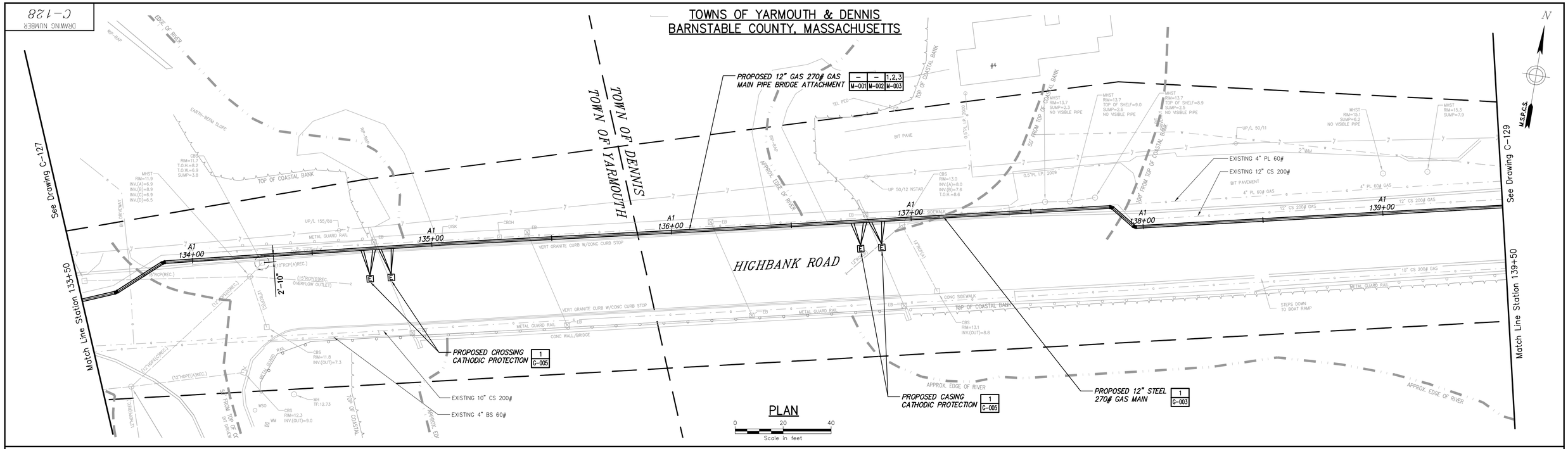
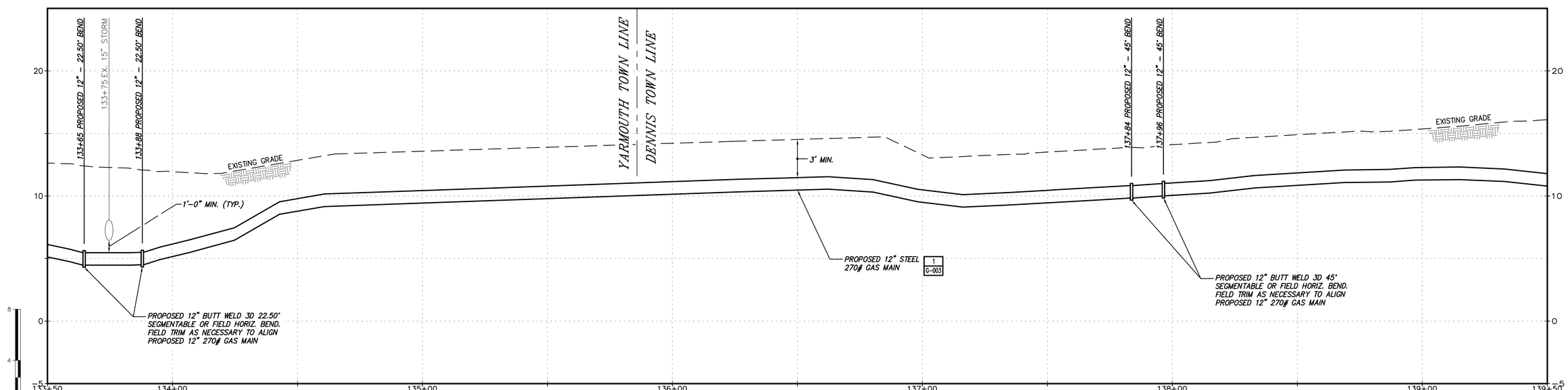
DRAWING NUMBER C-128

TOWNS OF YARMOUTH & DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



PROFILE

Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-128-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-128-29847		C-128

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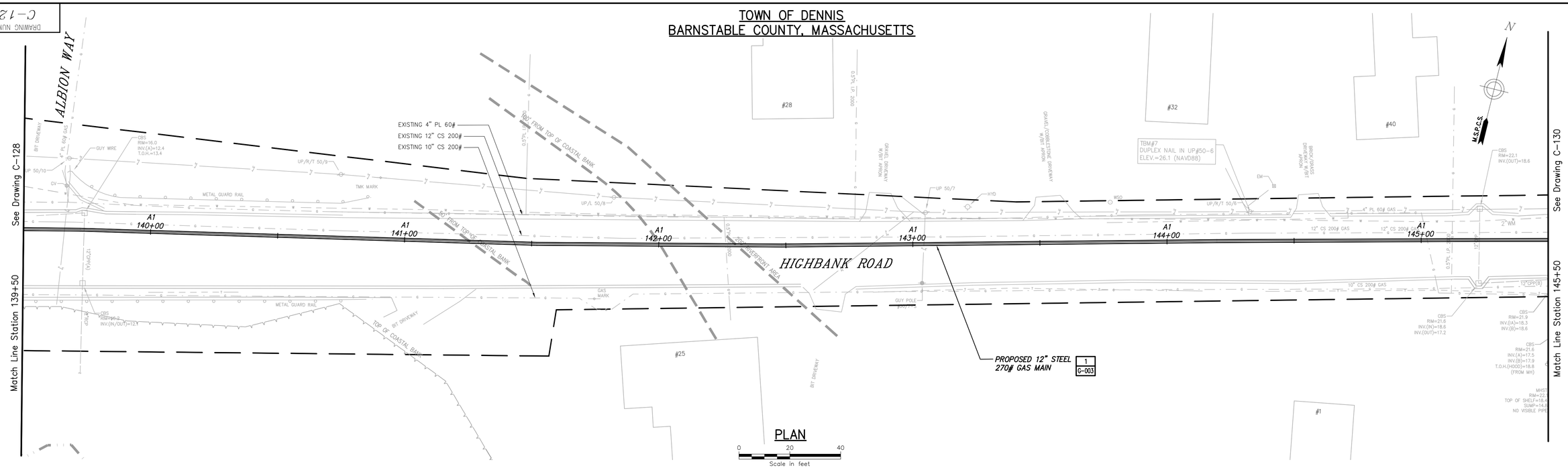
DRAWING NUMBER C-129

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



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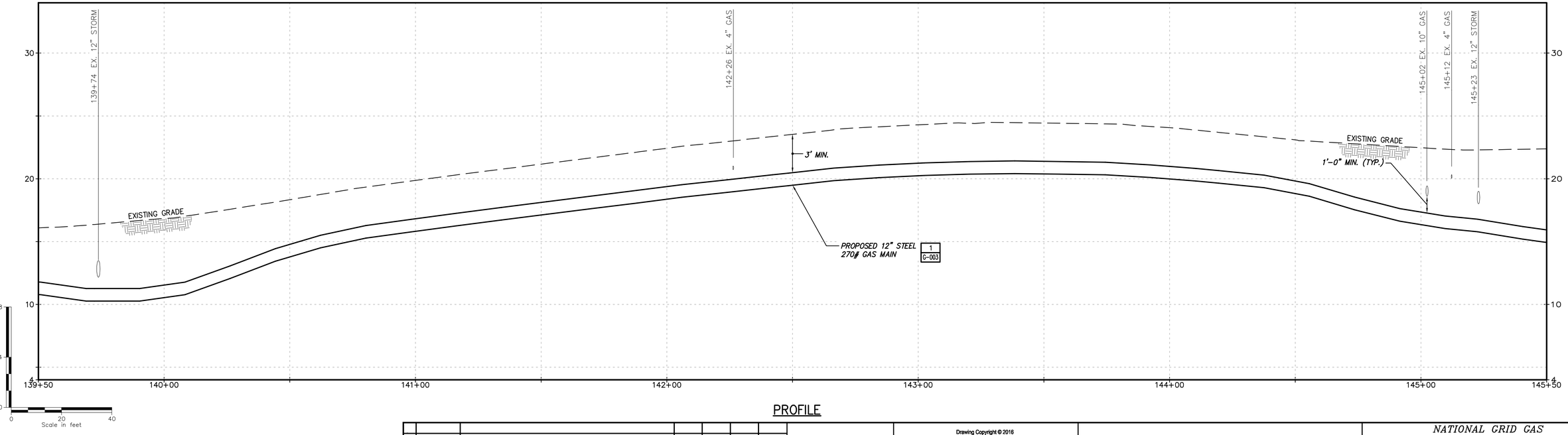

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-129-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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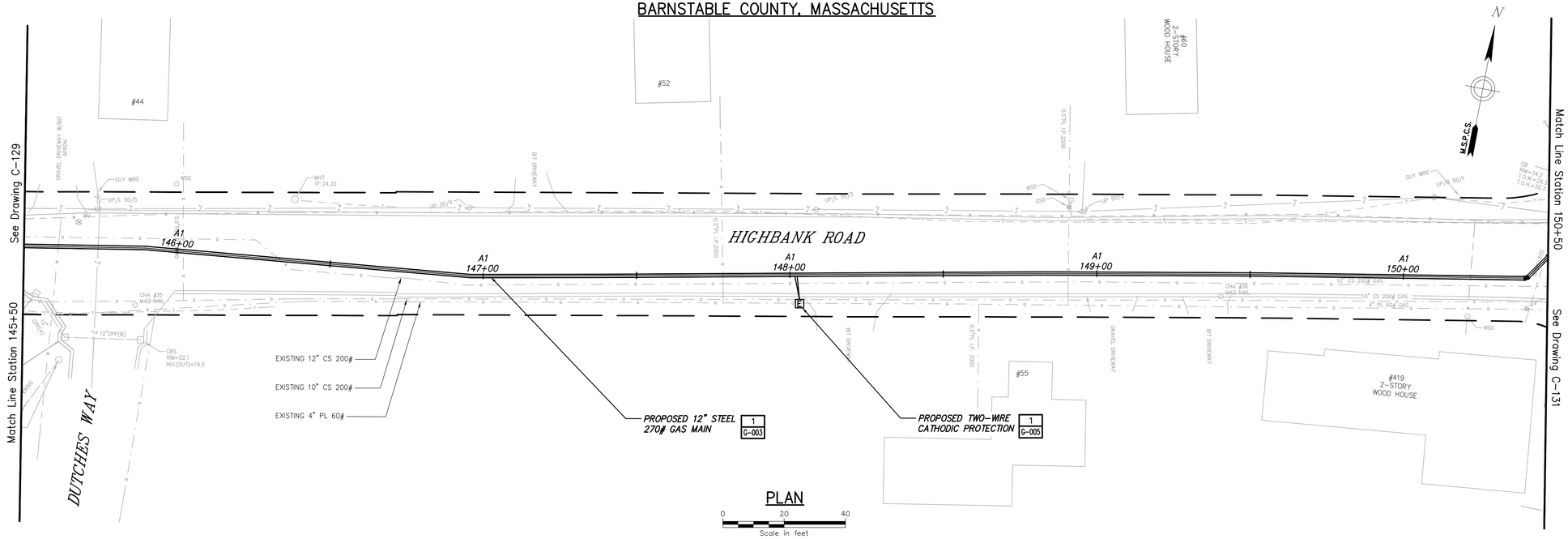
DRAWING NUMBER
C-130

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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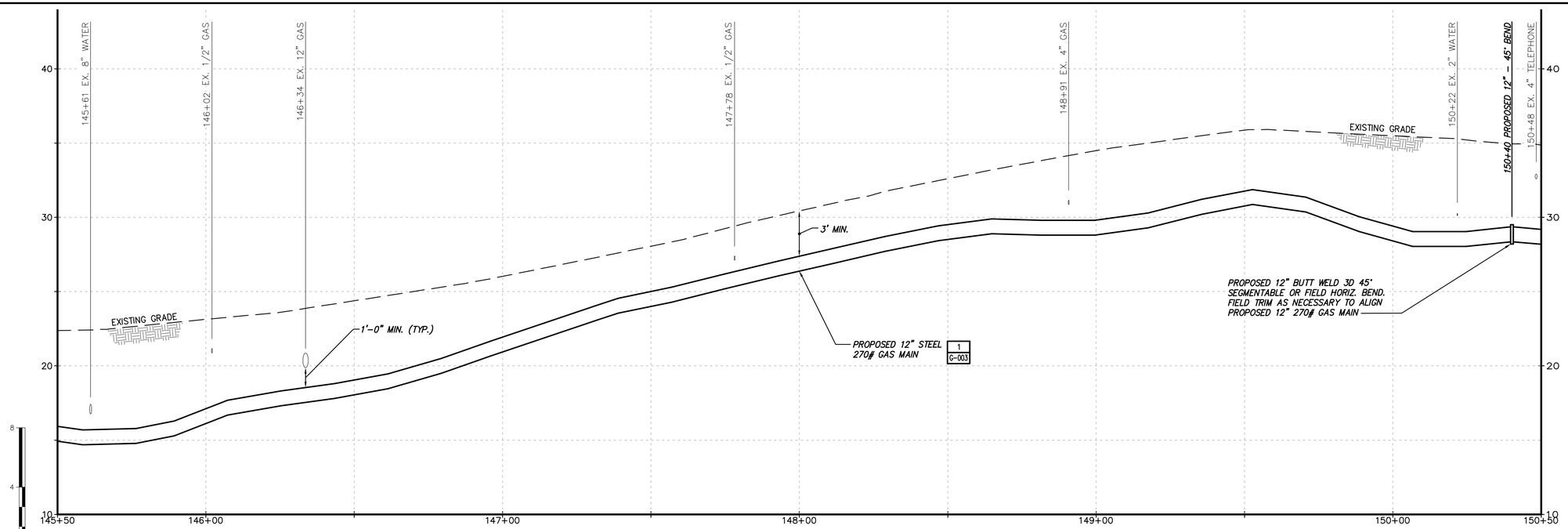
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-130-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-130-29847		C-130

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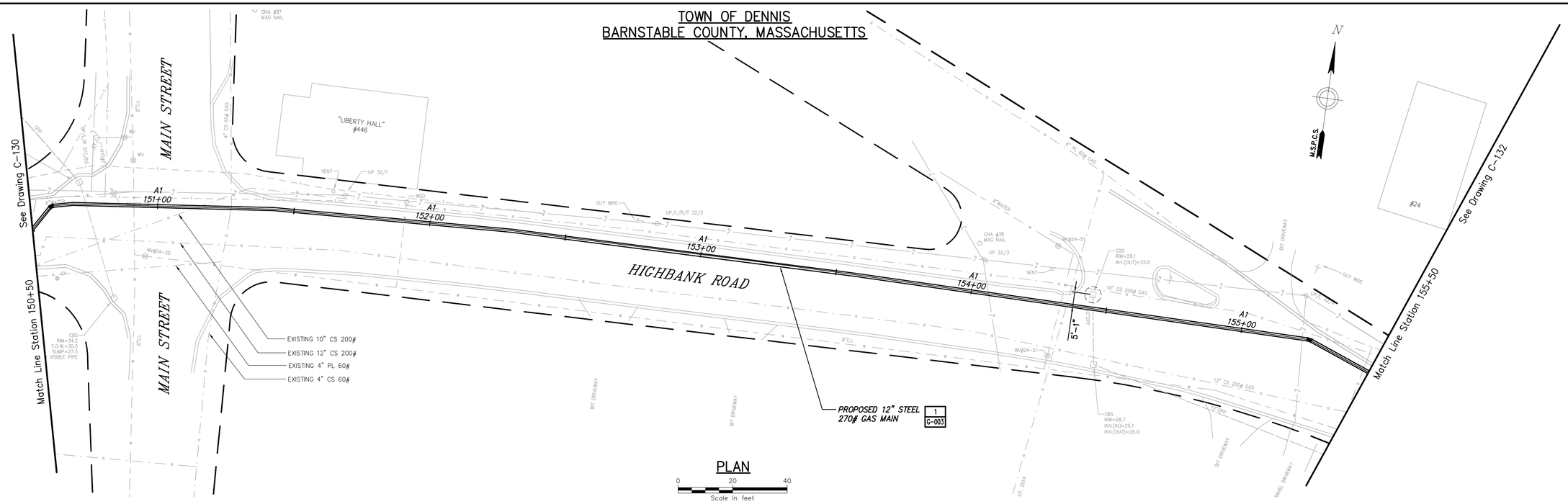
TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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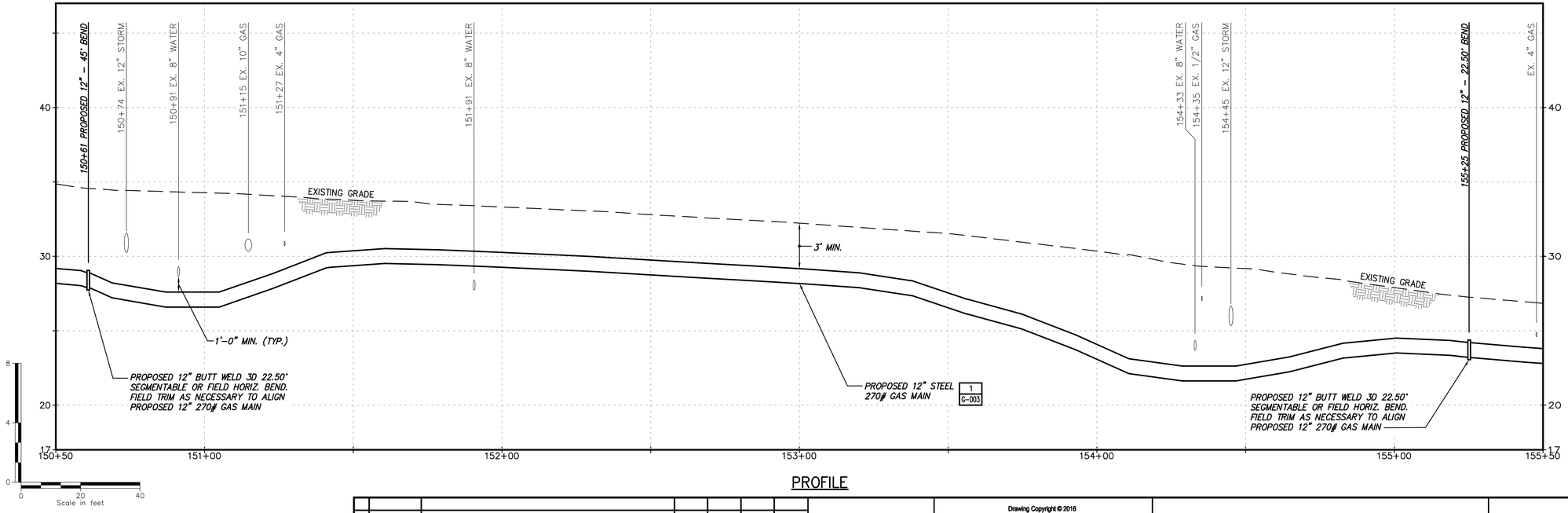
Scale in feet



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CONSTRUCTION DRAWINGS
C-131-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-131-29847	SEQUENCE No.	DRAWING NUMBER C-131
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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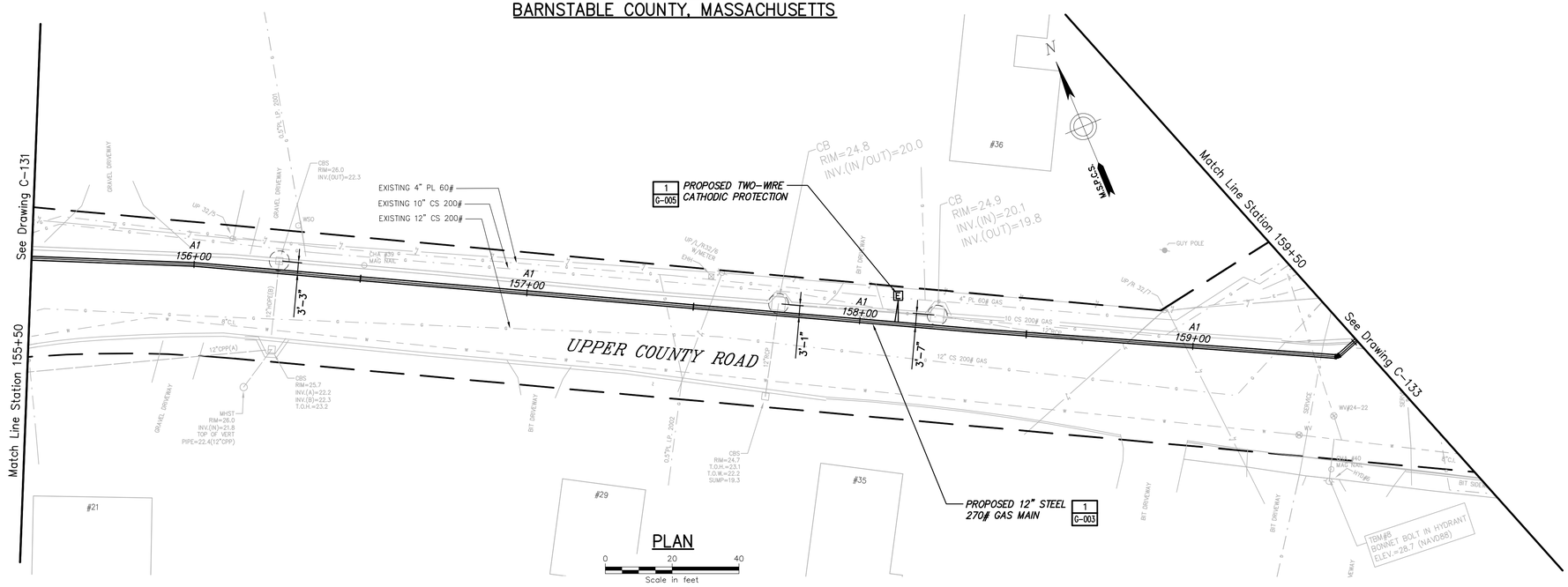
TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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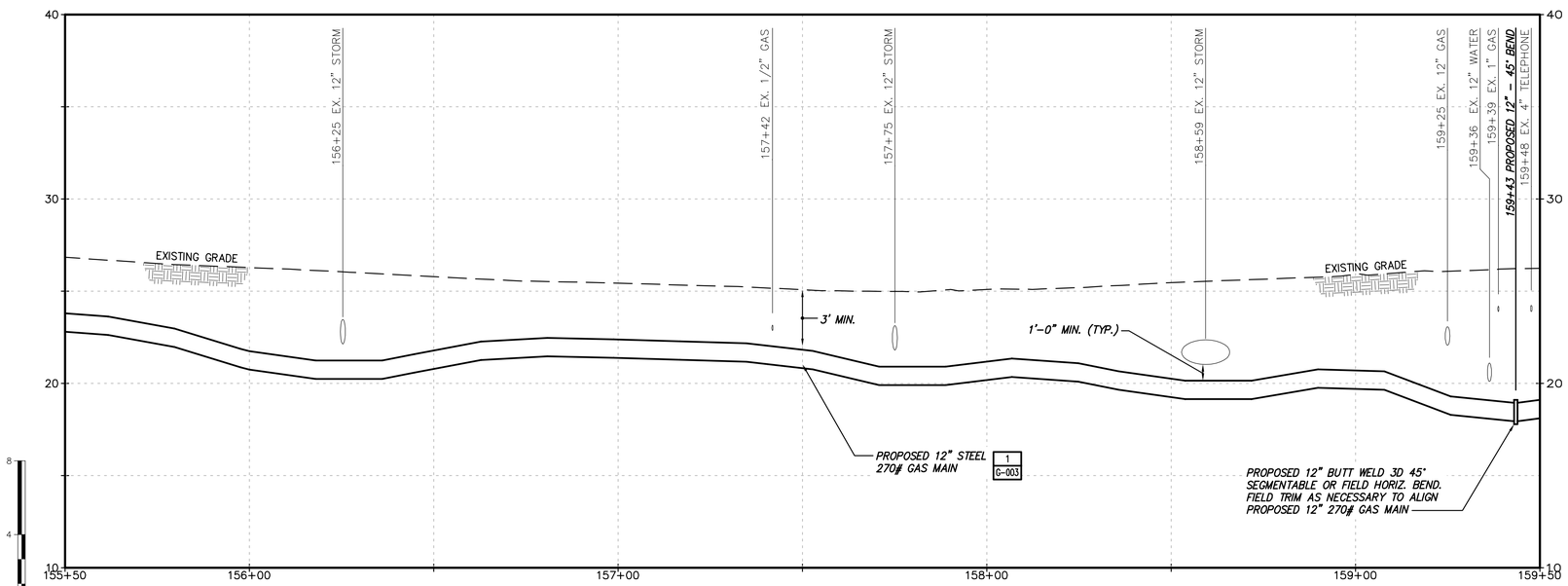
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-132-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-132-29847		C-132

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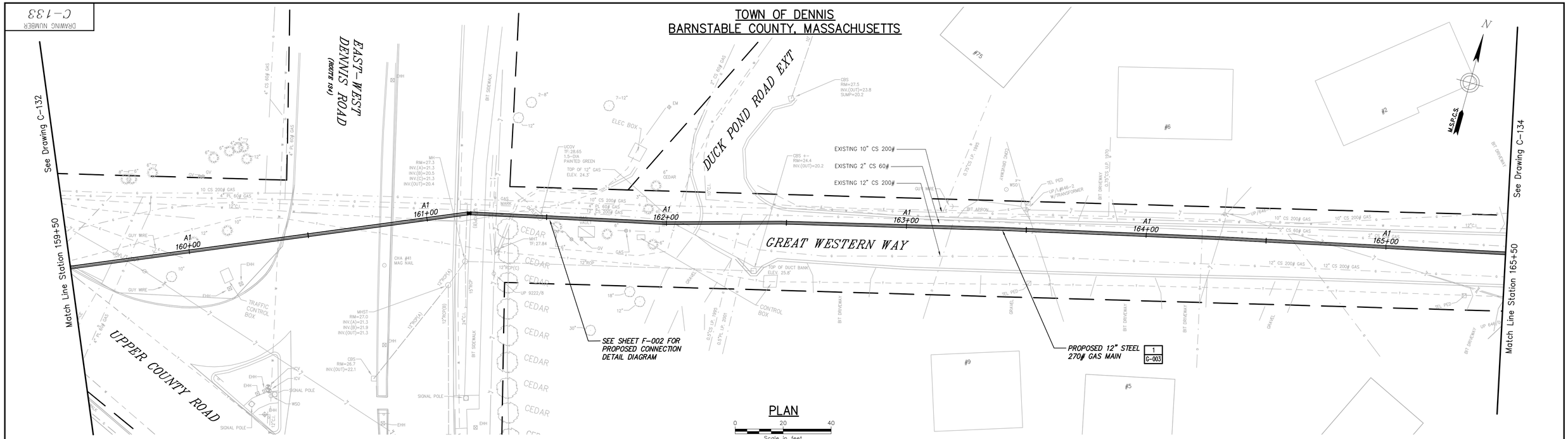
DRAWING NUMBER C-133

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



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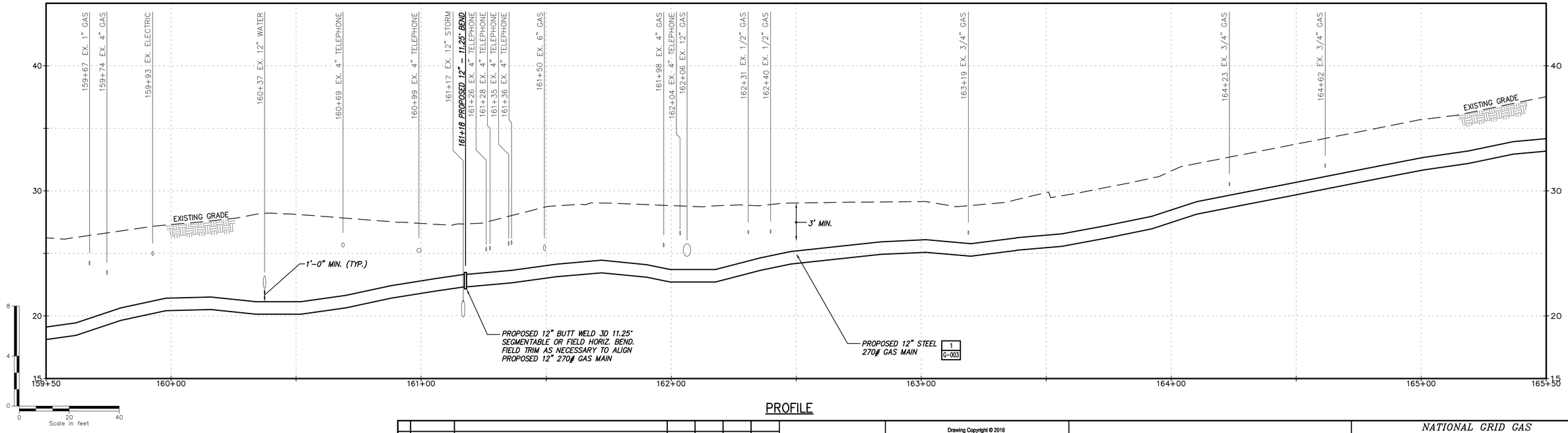

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-133-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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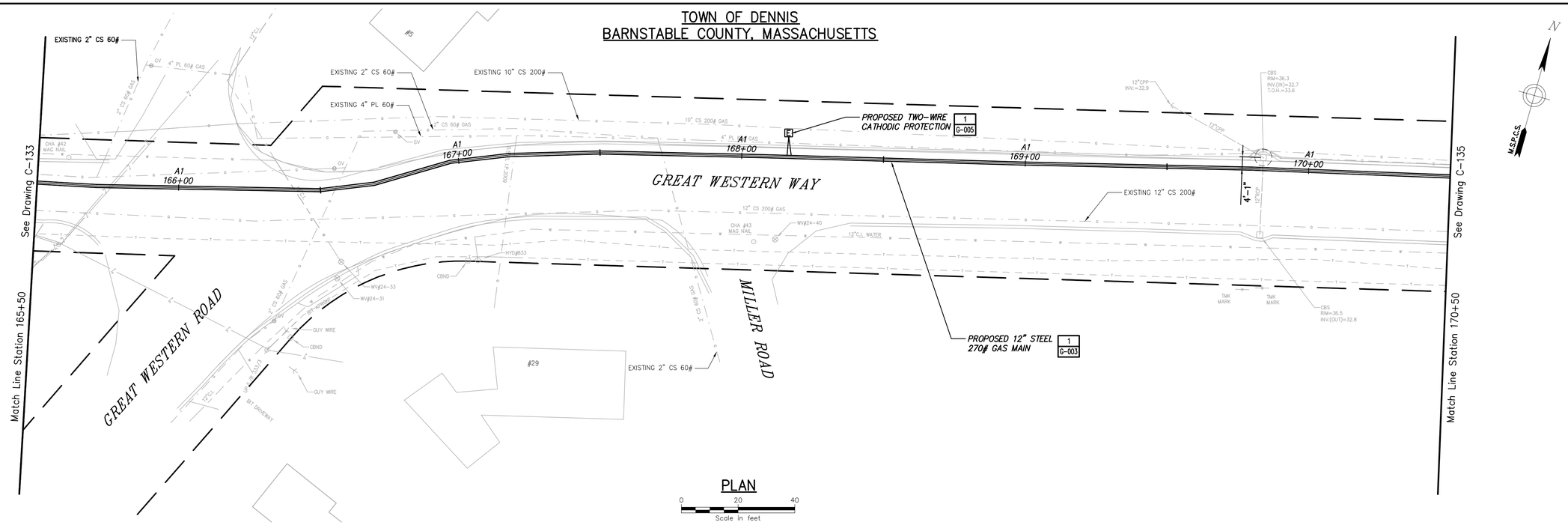
TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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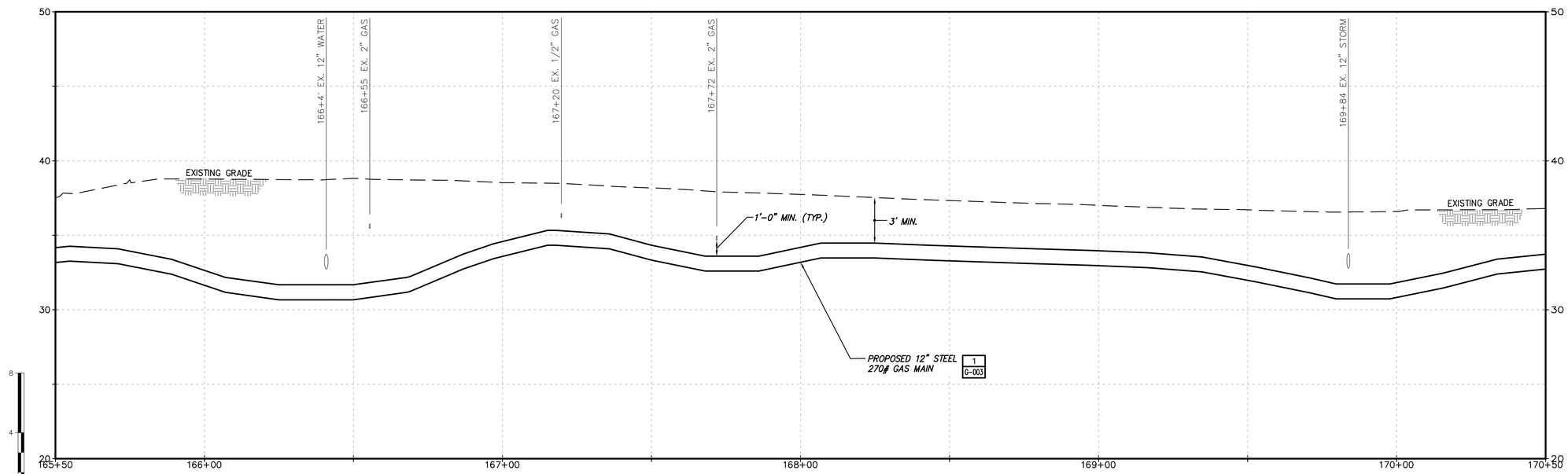
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-134-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-134-29847		C-134

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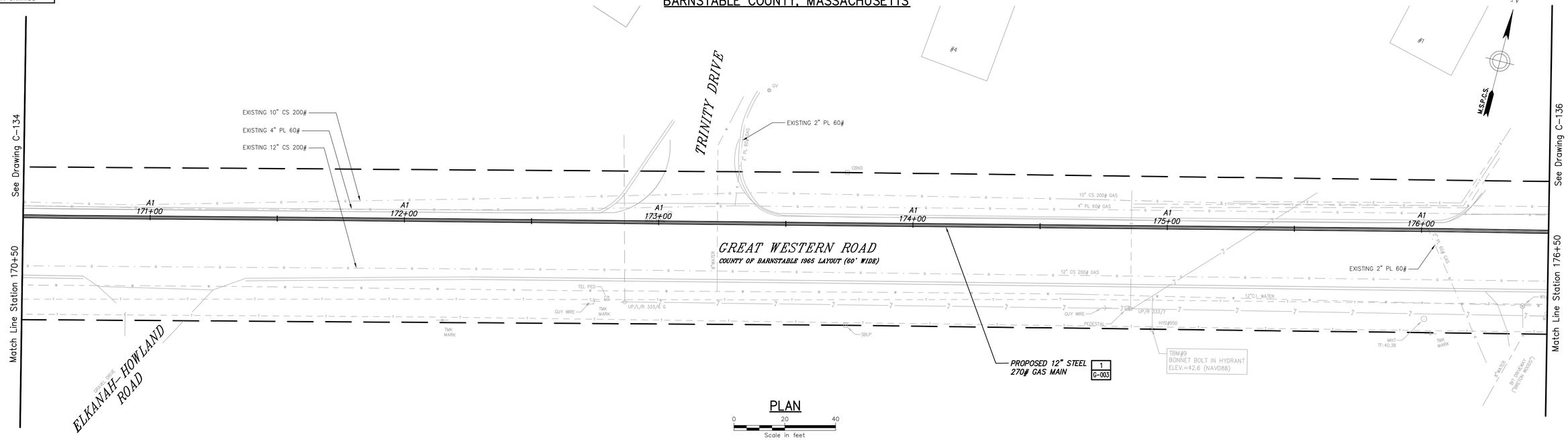
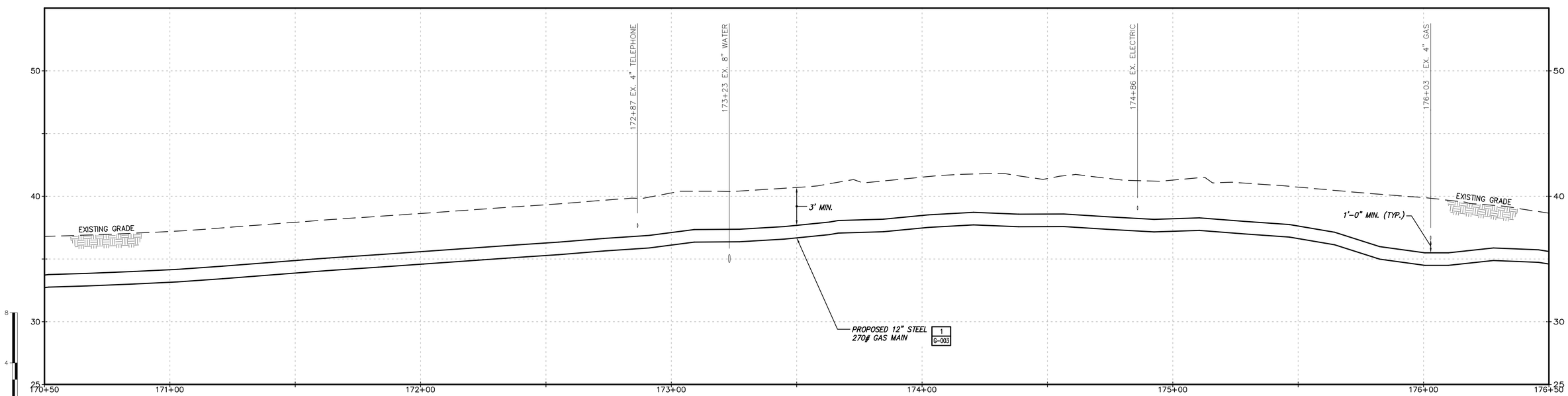
DRAWING NUMBER C-135

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-135-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-135-29847		C-135

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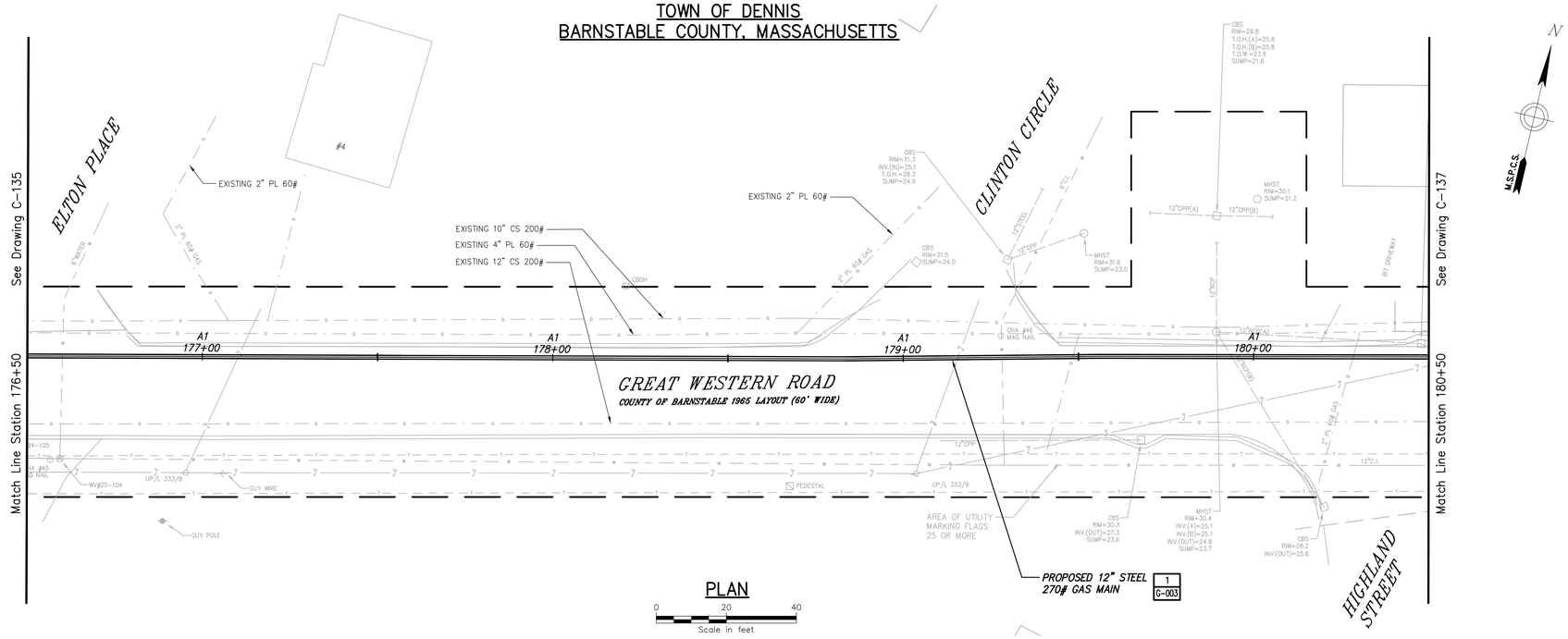
C-136

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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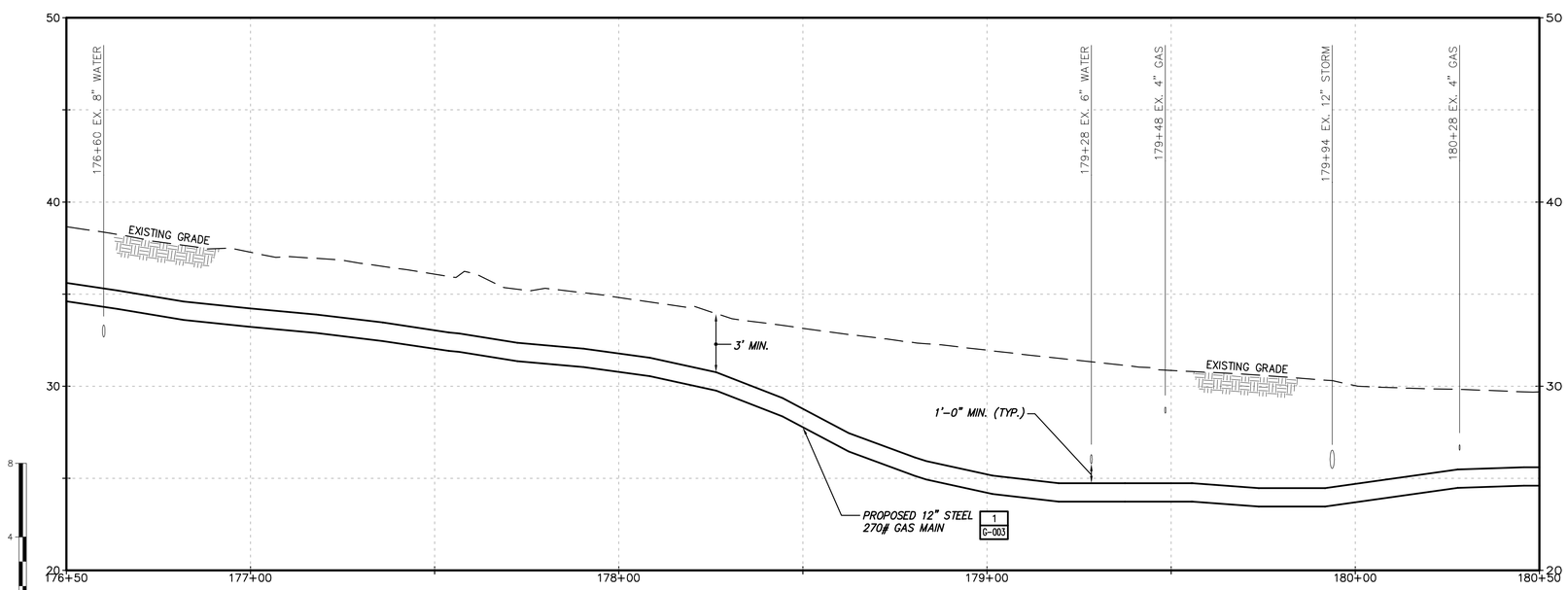
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-136-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-136-29847		C-136

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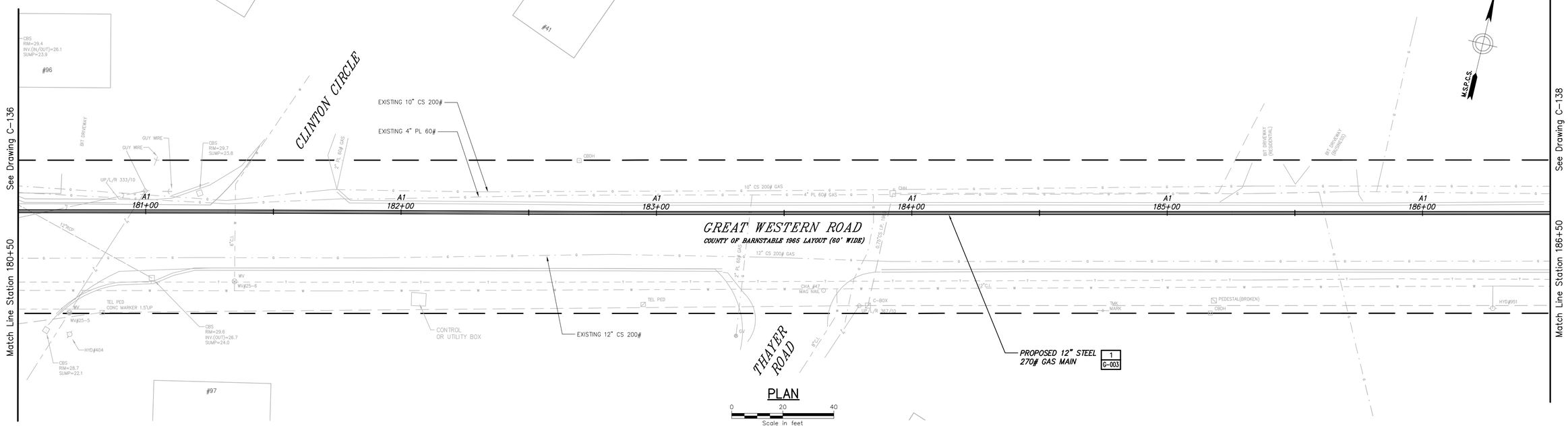
DRAWING NUMBER C-137

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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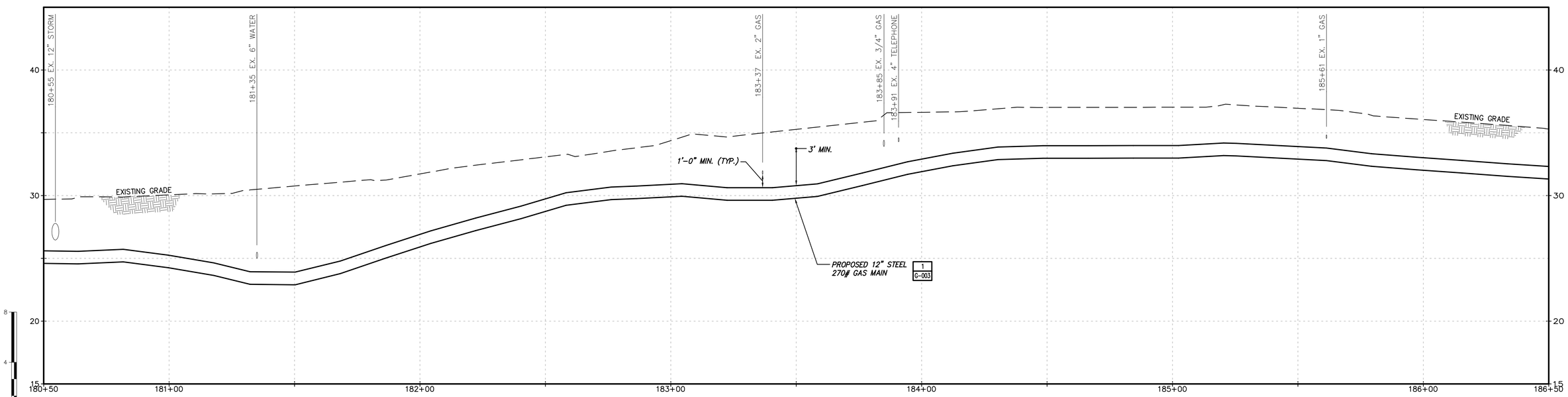
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-137-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-137-29847		C-137

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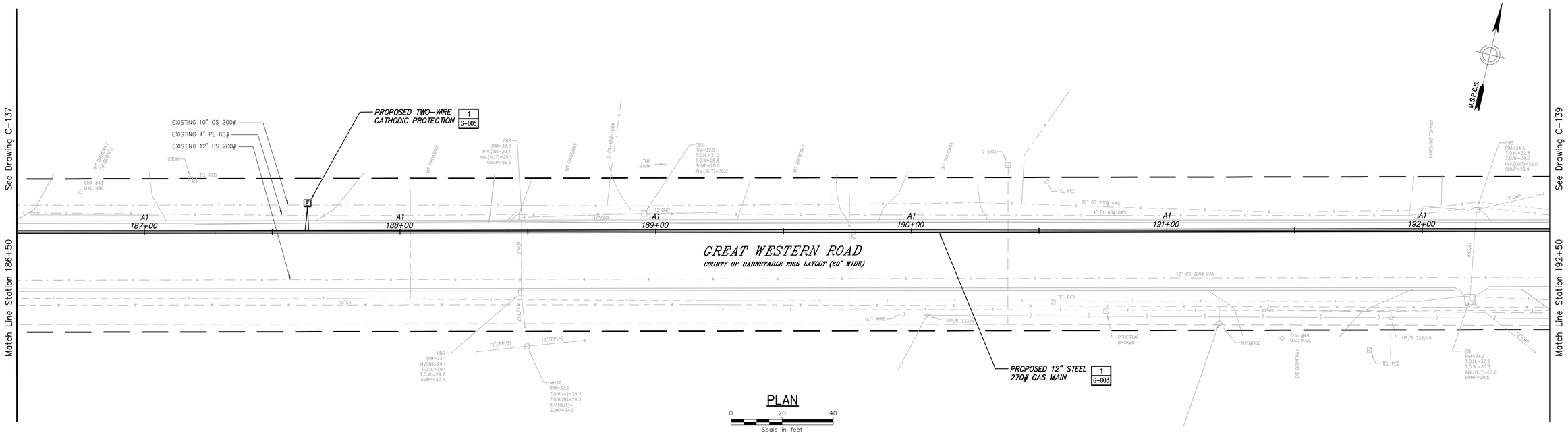
TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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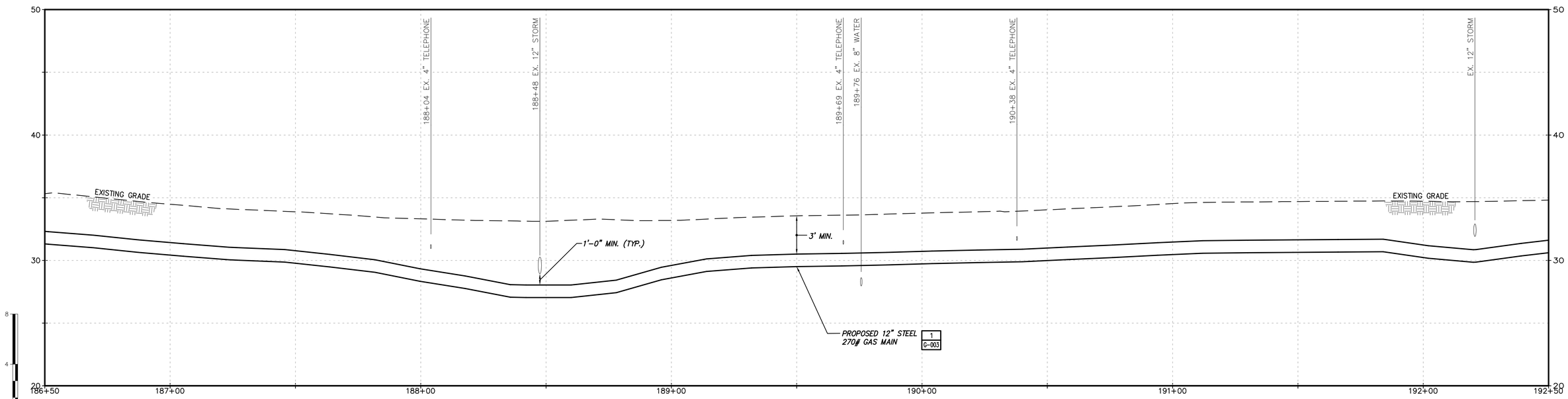

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-138-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-138-29847		C-138

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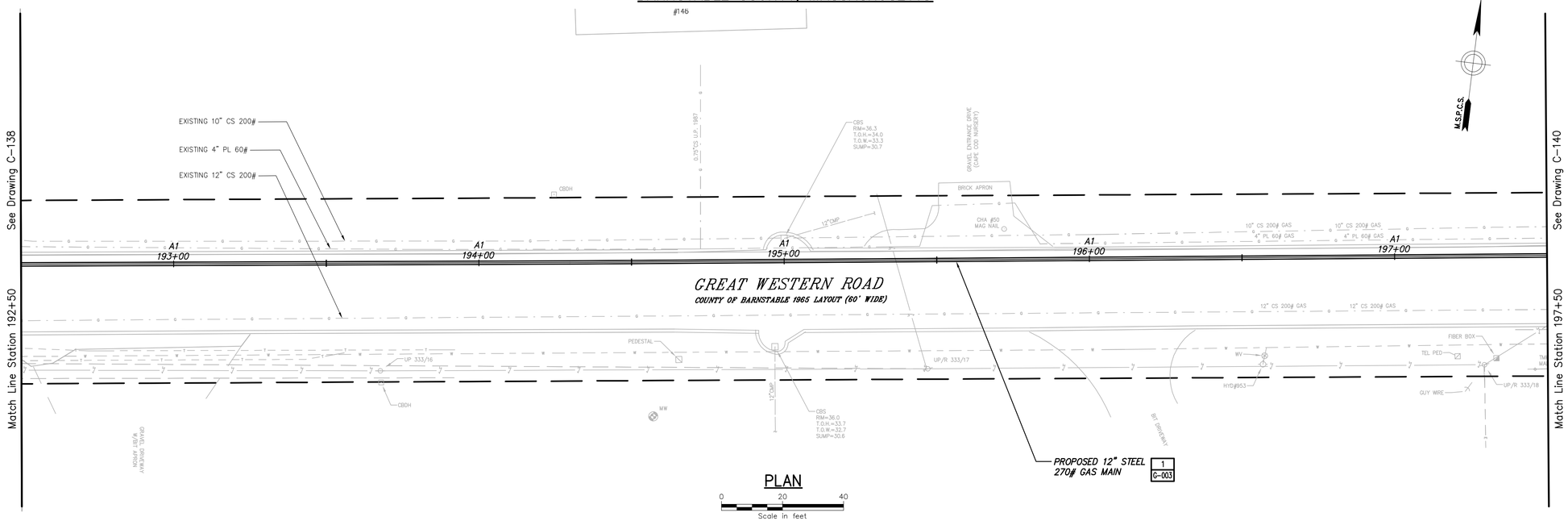
DRAWING NUMBER
C-139

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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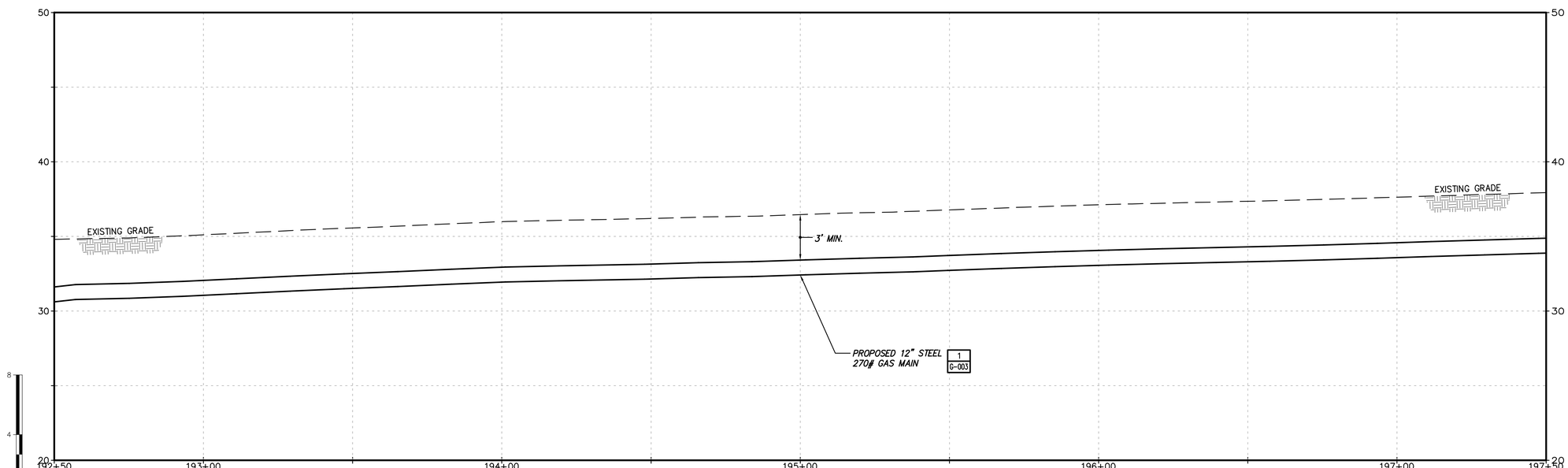

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NATIONAL GRID GAS
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CONSTRUCTION DRAWINGS

C-139-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-139-29847	SEQUENCE No.	DRAWING NUMBER C-139
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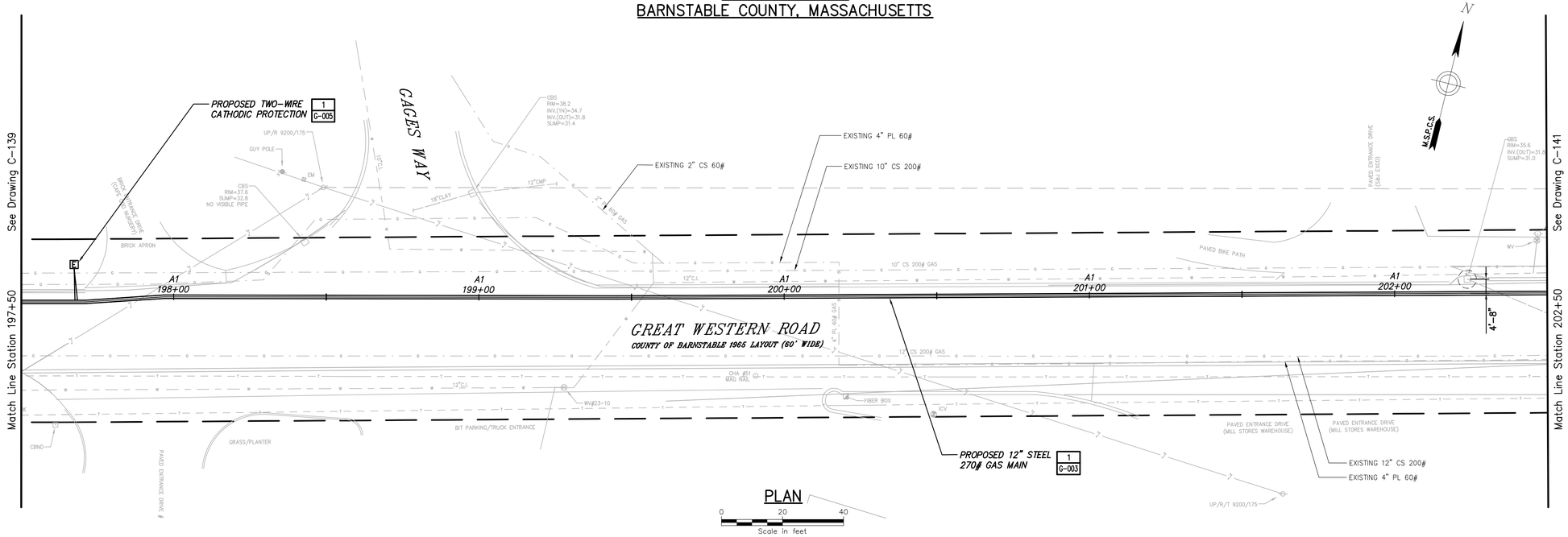
TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



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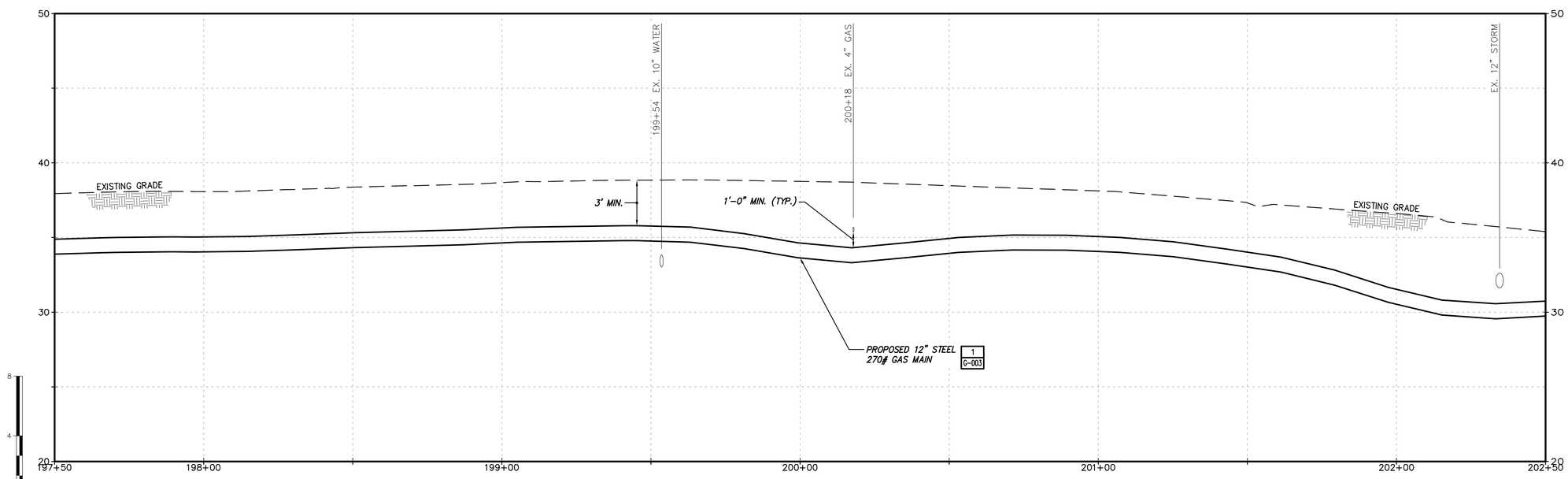

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-140-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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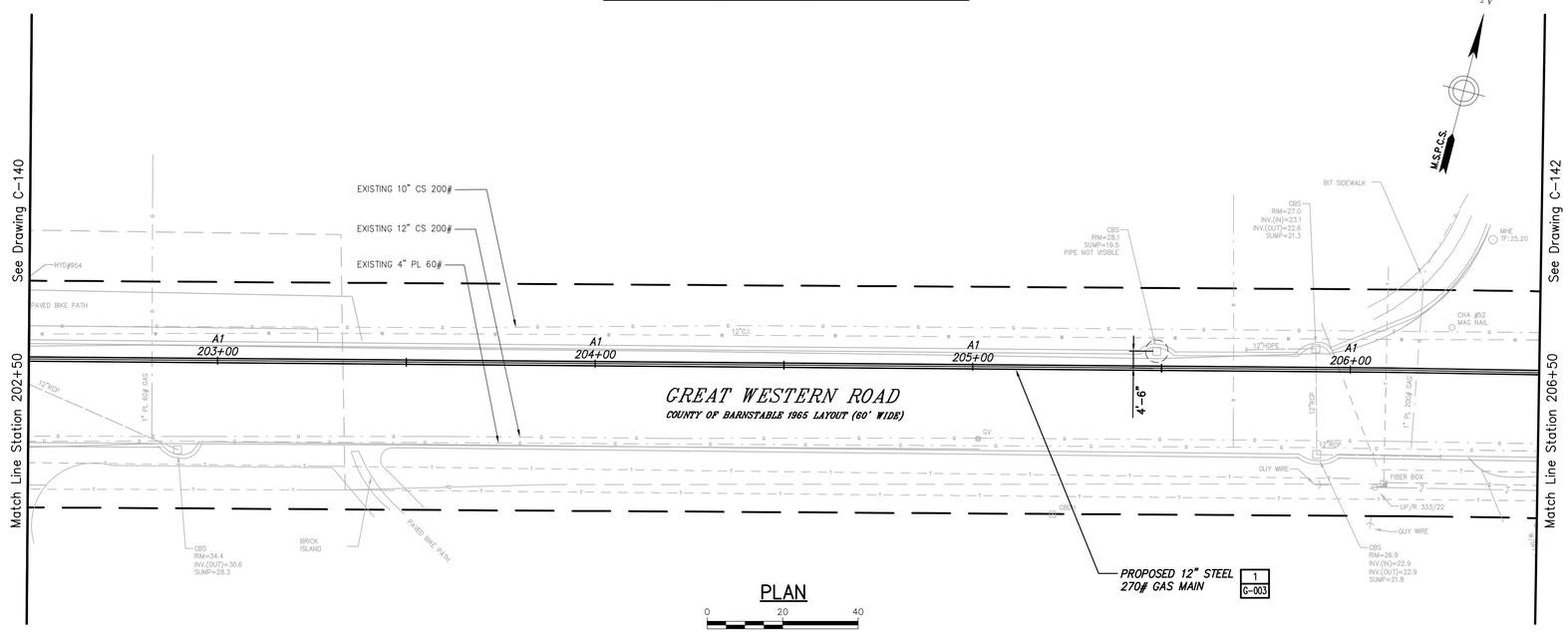
DRAWING NUMBER
C-141

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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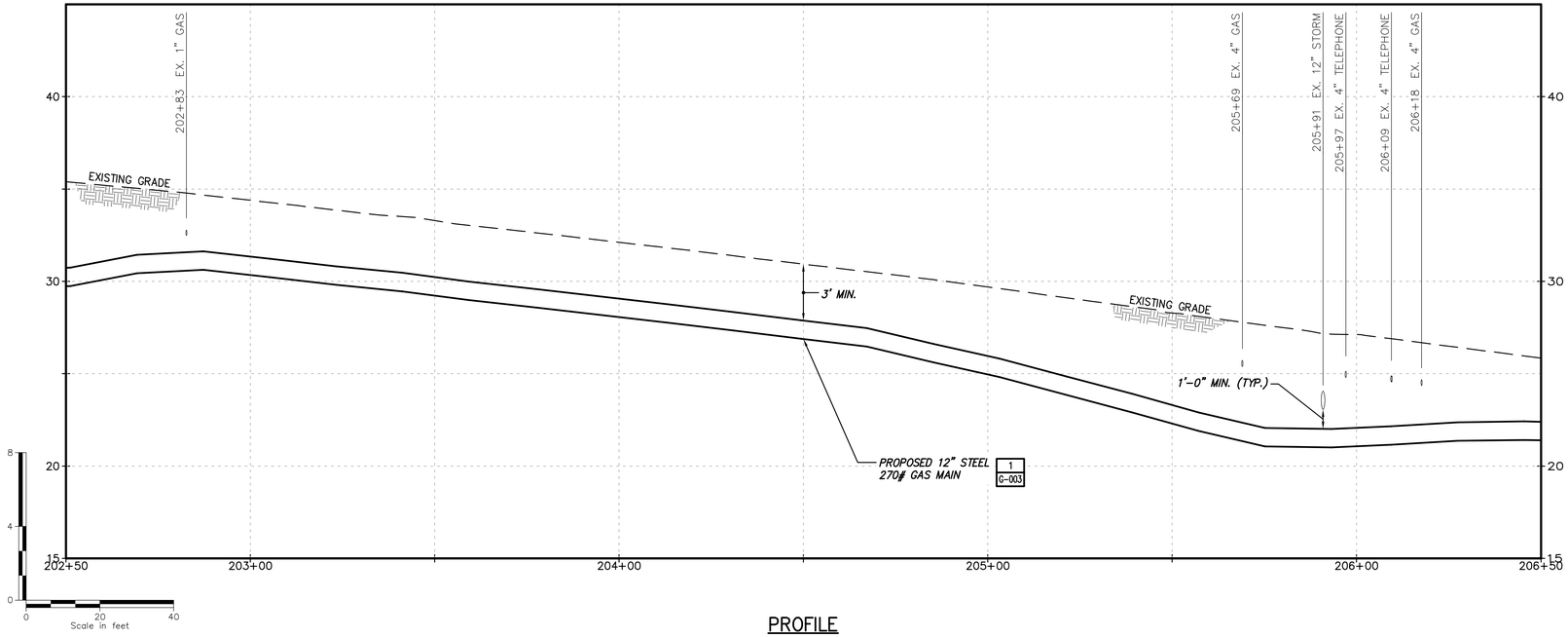
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-141-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-141-29847		C-141

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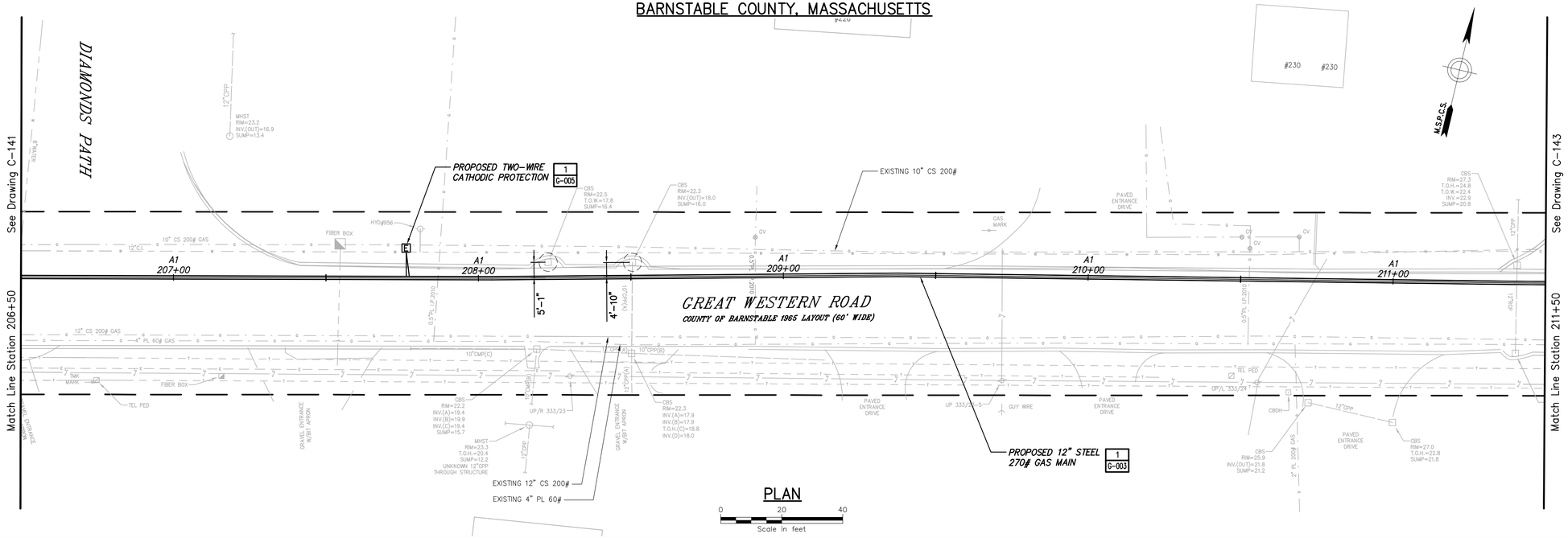
C-142

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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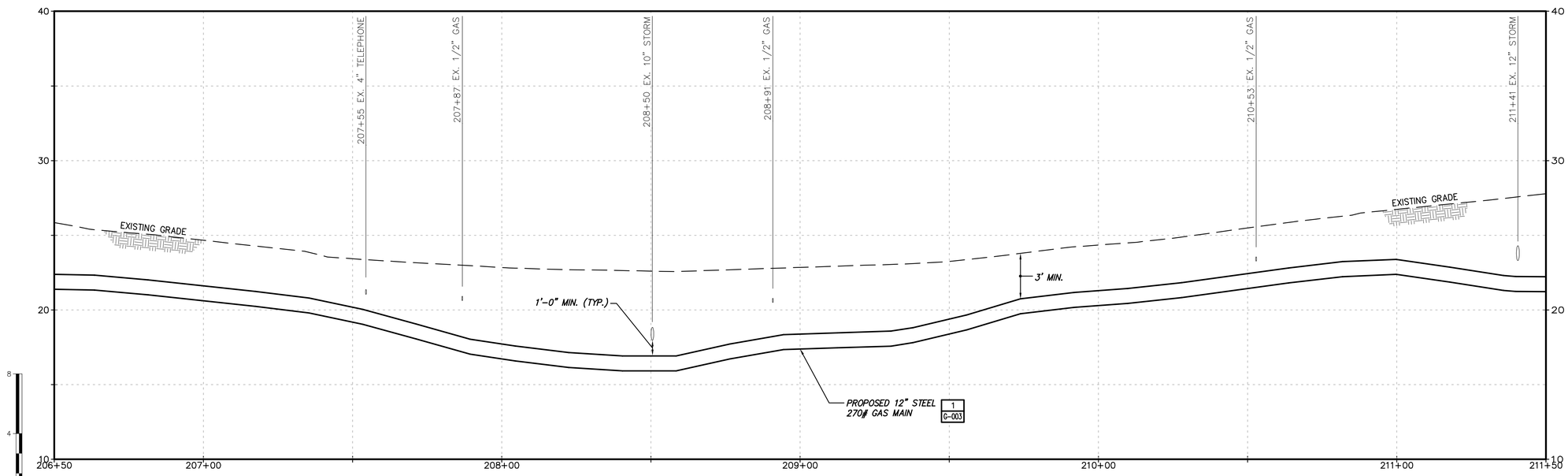
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-142-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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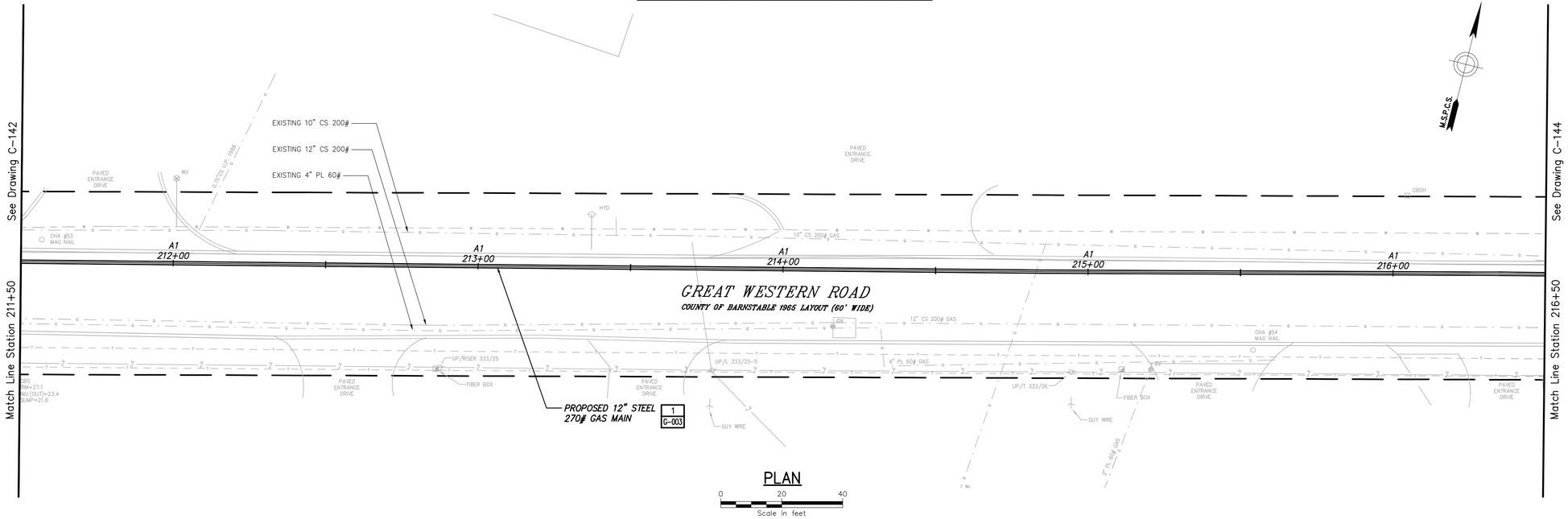
DRAWING NUMBER
C-143

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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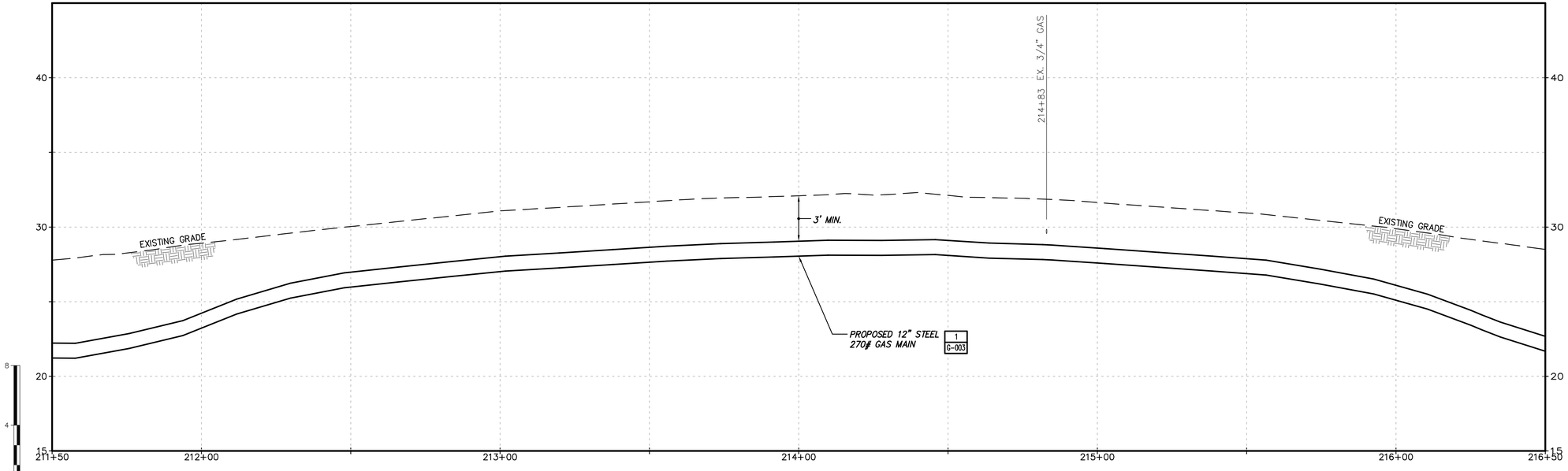
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-143-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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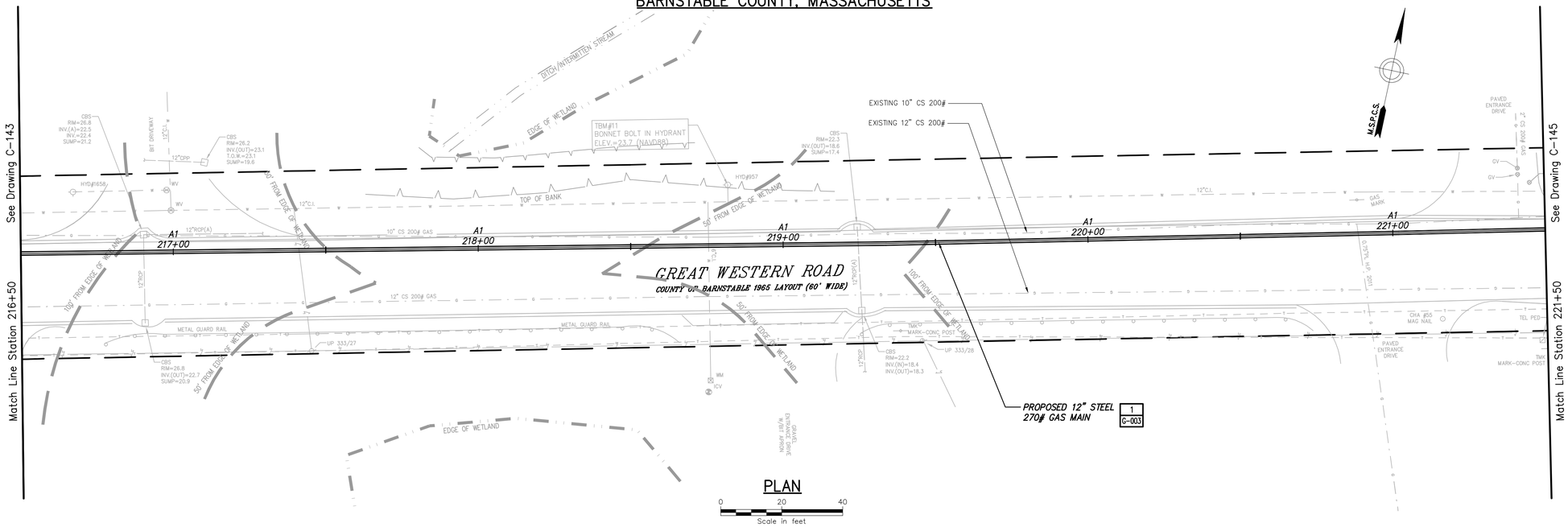
DRAWING NUMBER
C-144

TOWN OF DENNIS
BARNSTABLE COUNTY, MASSACHUSETTS



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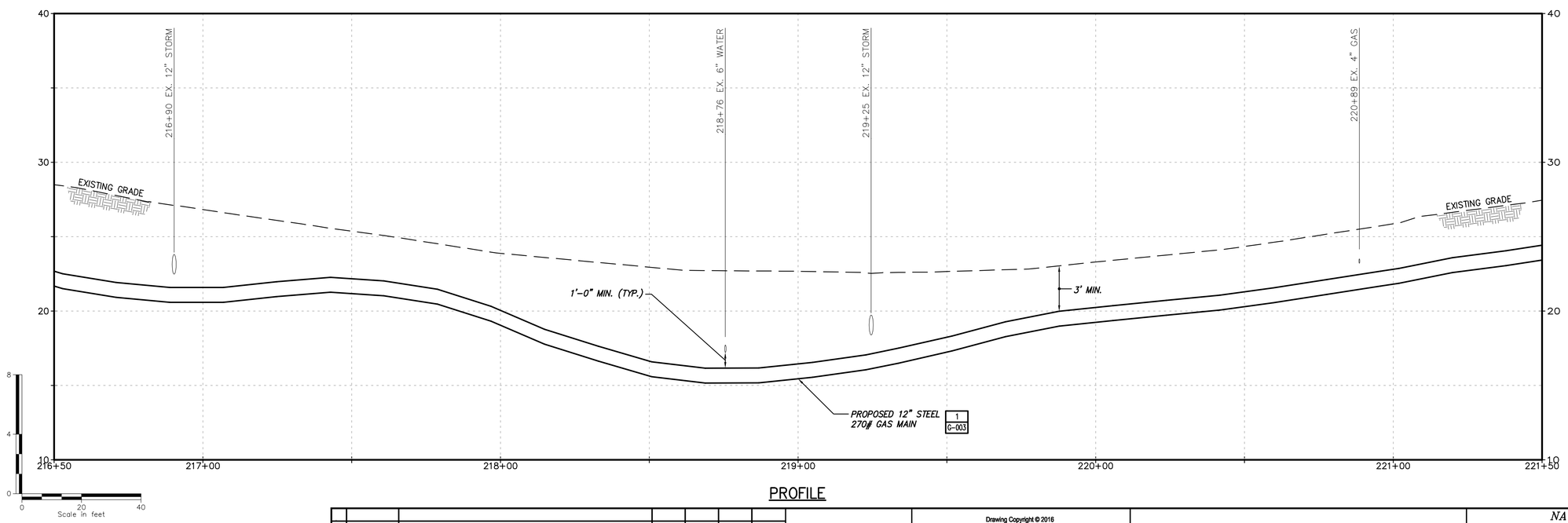

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-144-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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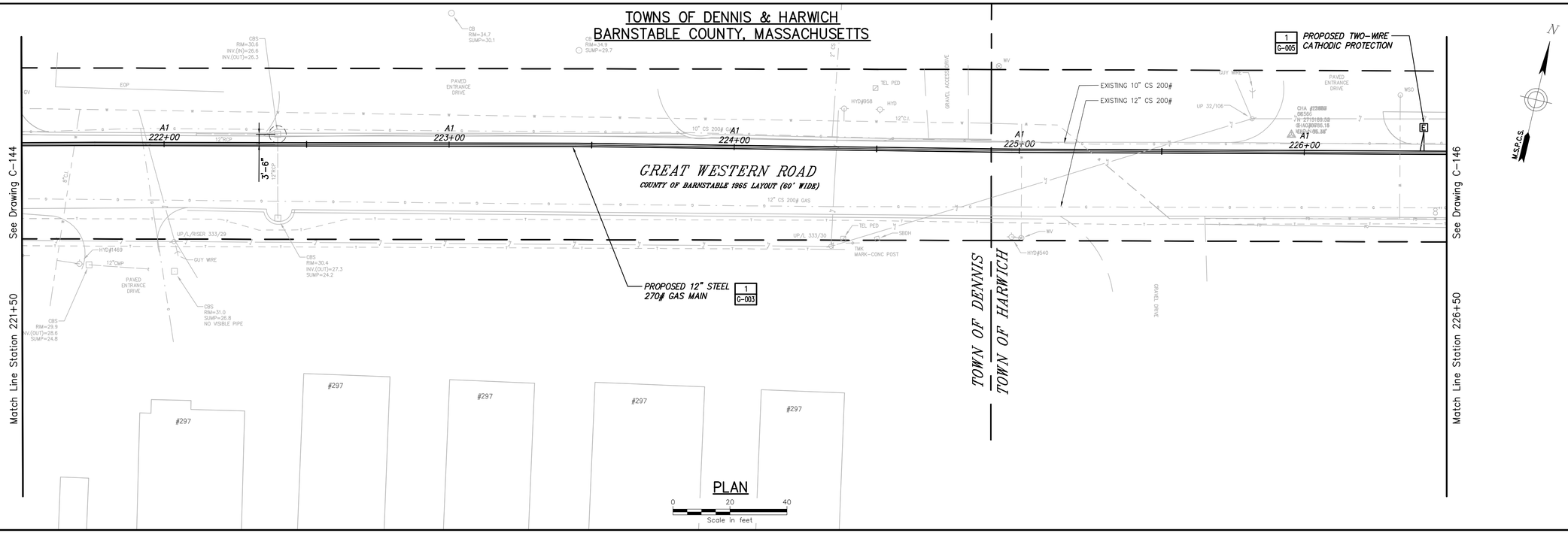
DRAWING NUMBER
C-145

TOWNS OF DENNIS & HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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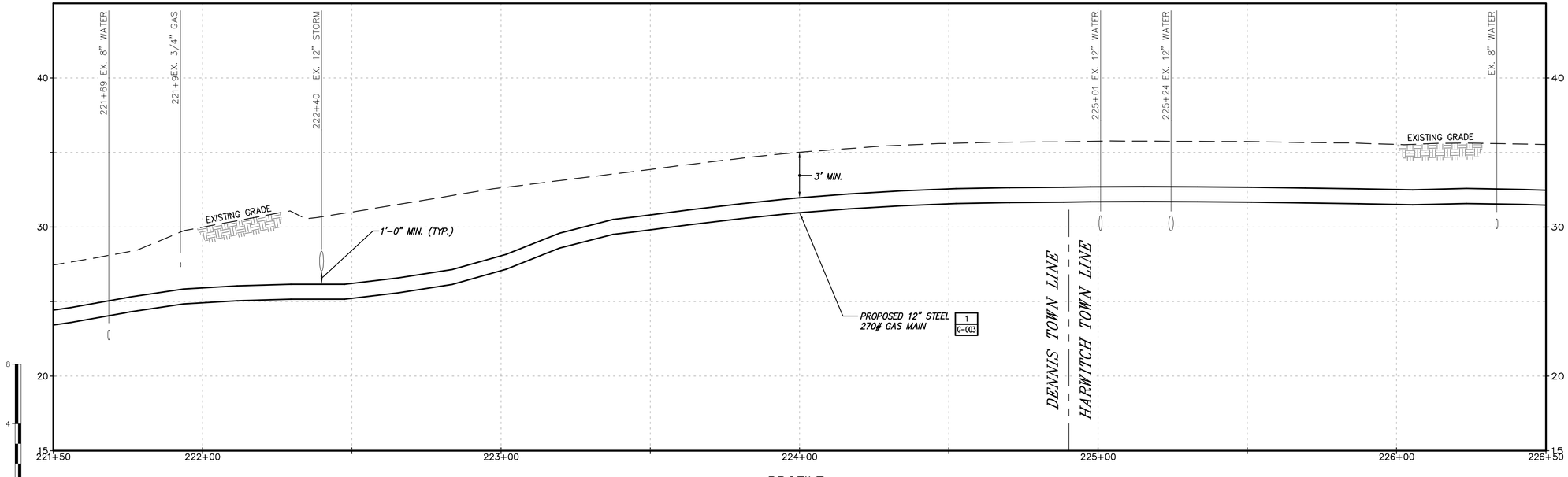
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-145-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-145-29847		C-145

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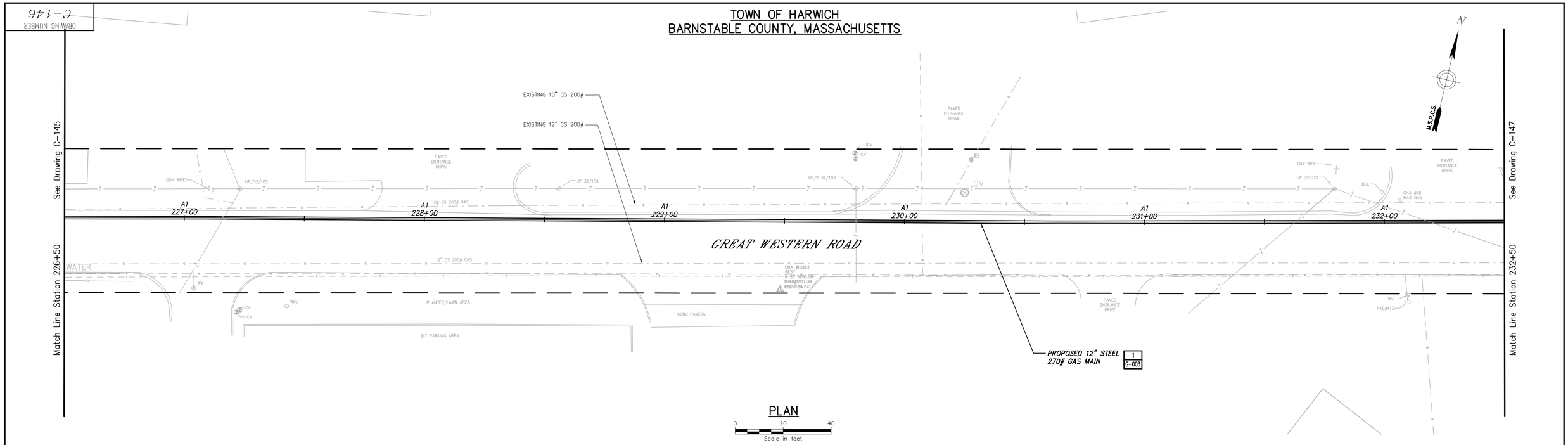
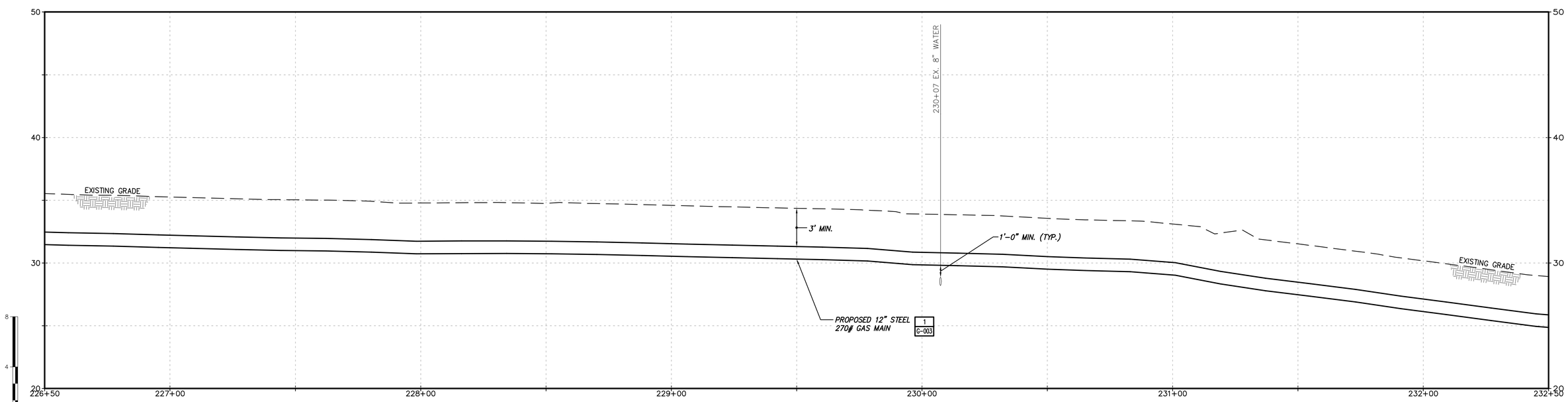
DRAWING NUMBER C-146

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-146-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-146-29847		C-146

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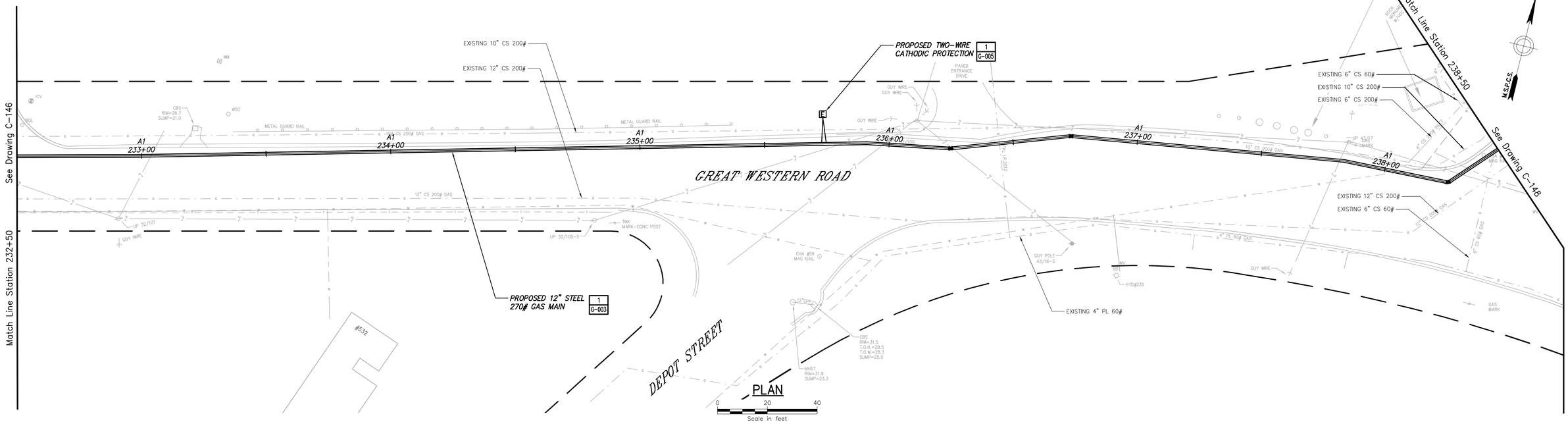
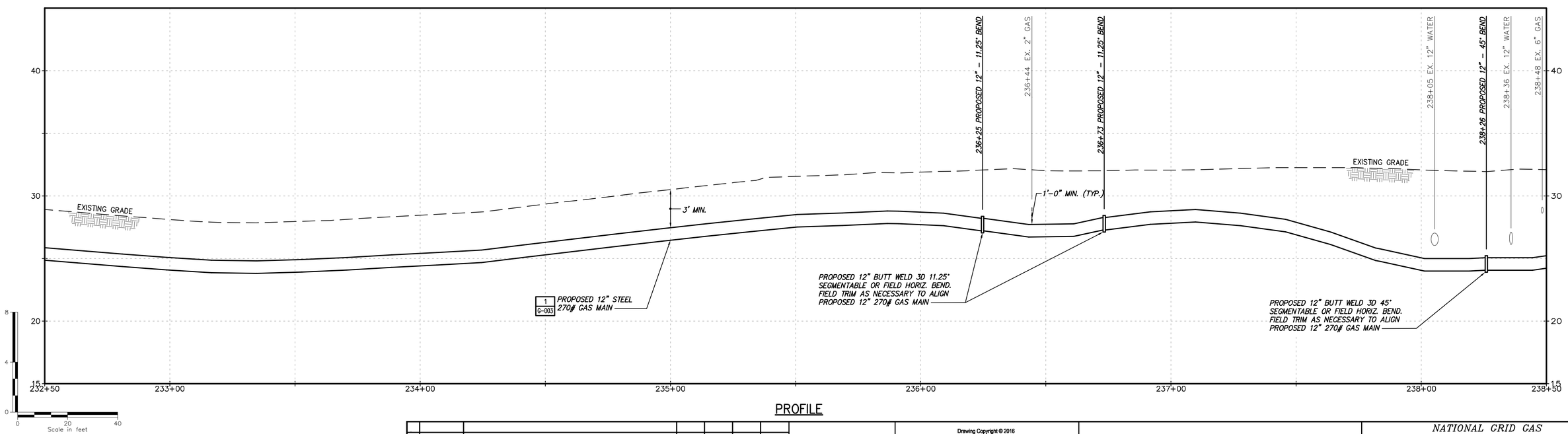
DRAWING NUMBER C-147

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-147-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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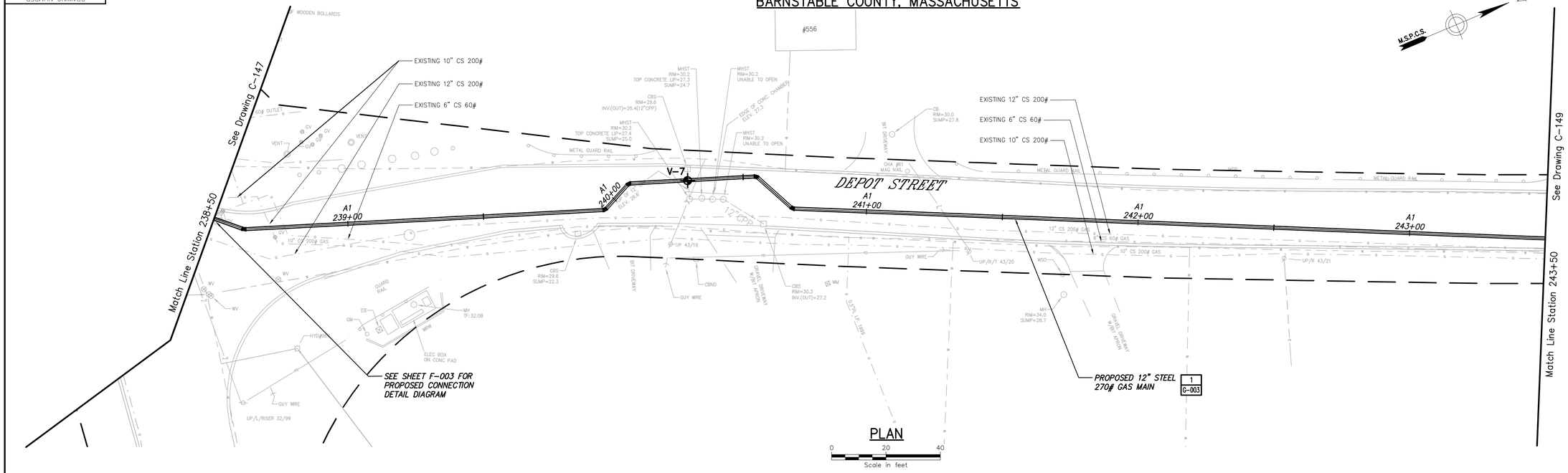
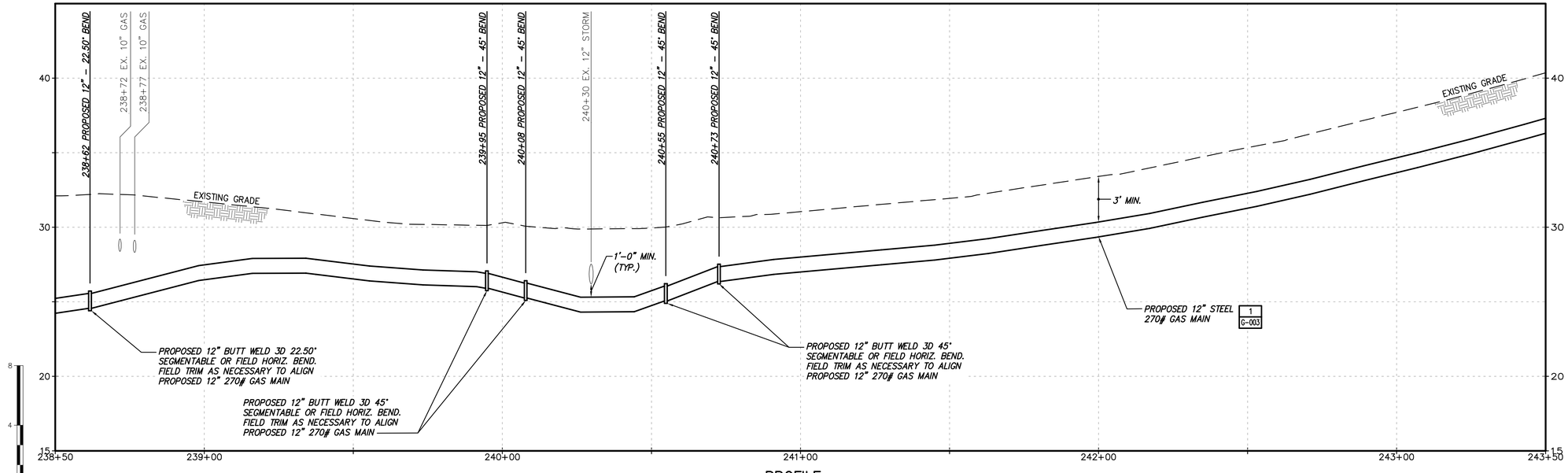
DRAWING NUMBER C-148

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-148-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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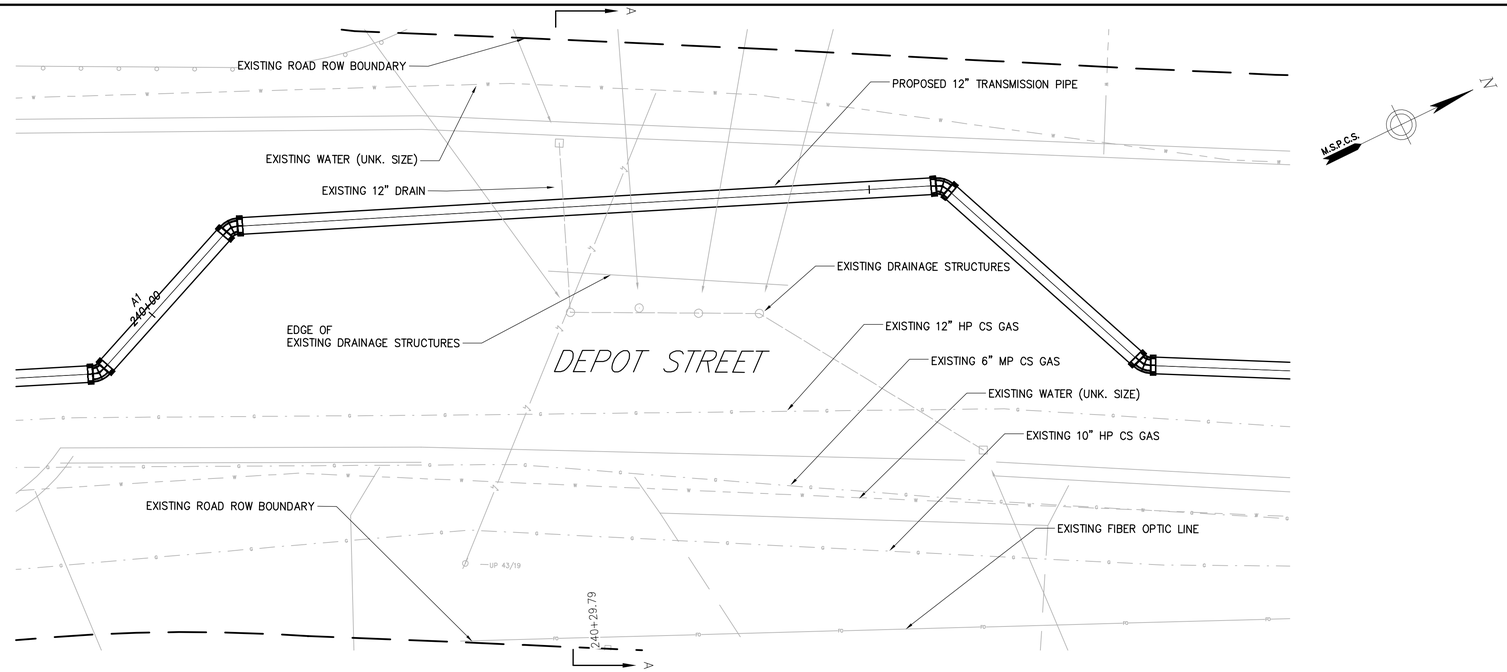

PLAN

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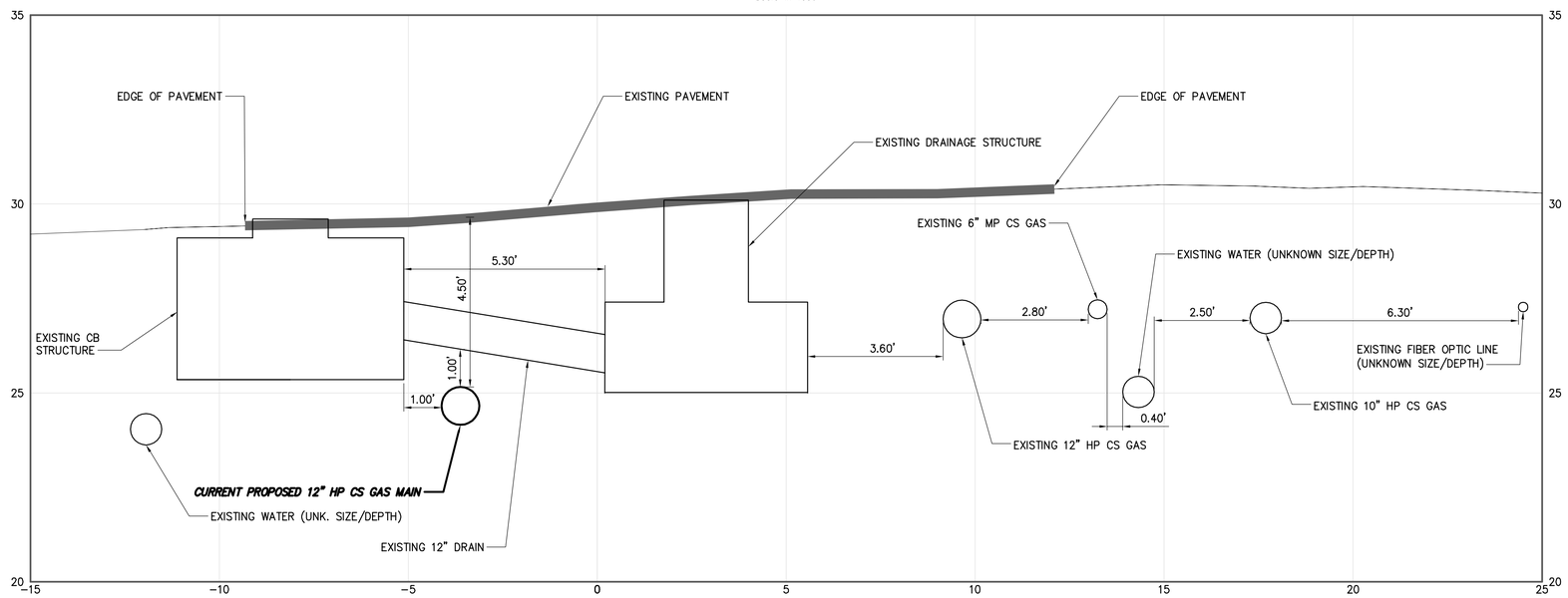
Scale in feet



SECTION A–A AT STATION A1 240+30

0 2 4
Scale in feet

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NATIONAL GRID GAS

MID–CAPE MAIN REPLACEMENT

CONSTRUCTION DRAWINGS

DEPOT STREET SECTION DRAWING
STATION A1 240+30

CAD FILE NAME: C-148A-29847
SEQUENCE No.:
DRAWING NUMBER: C-148A

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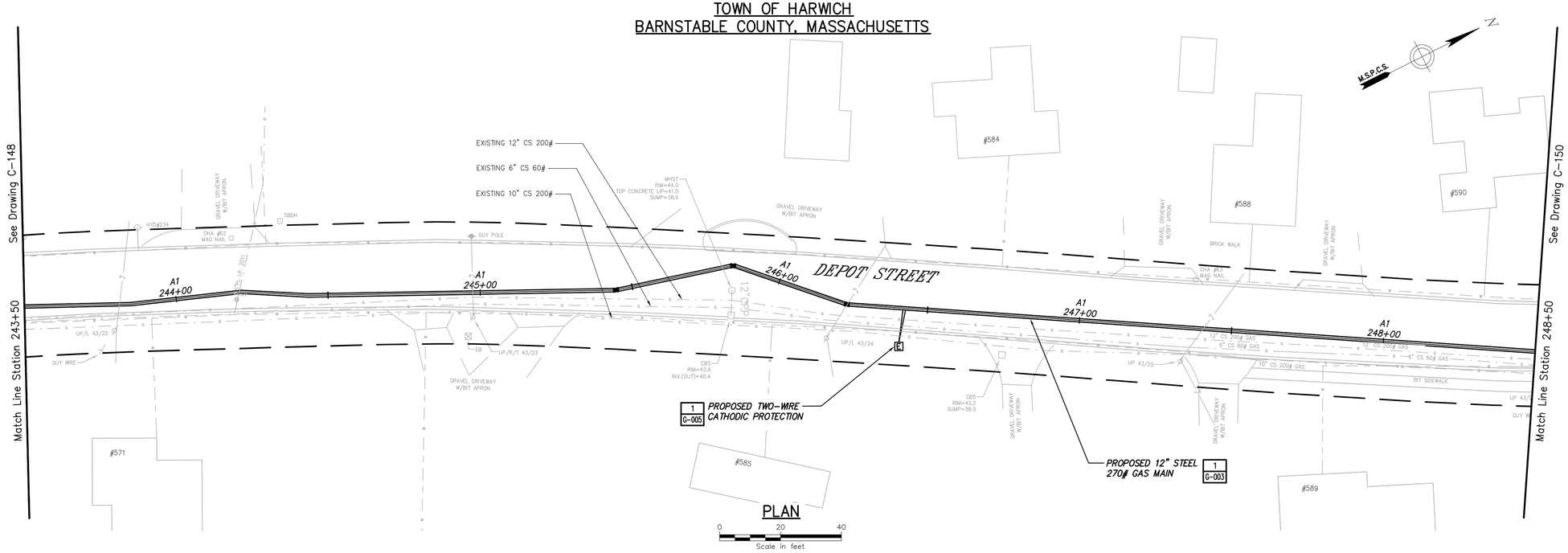
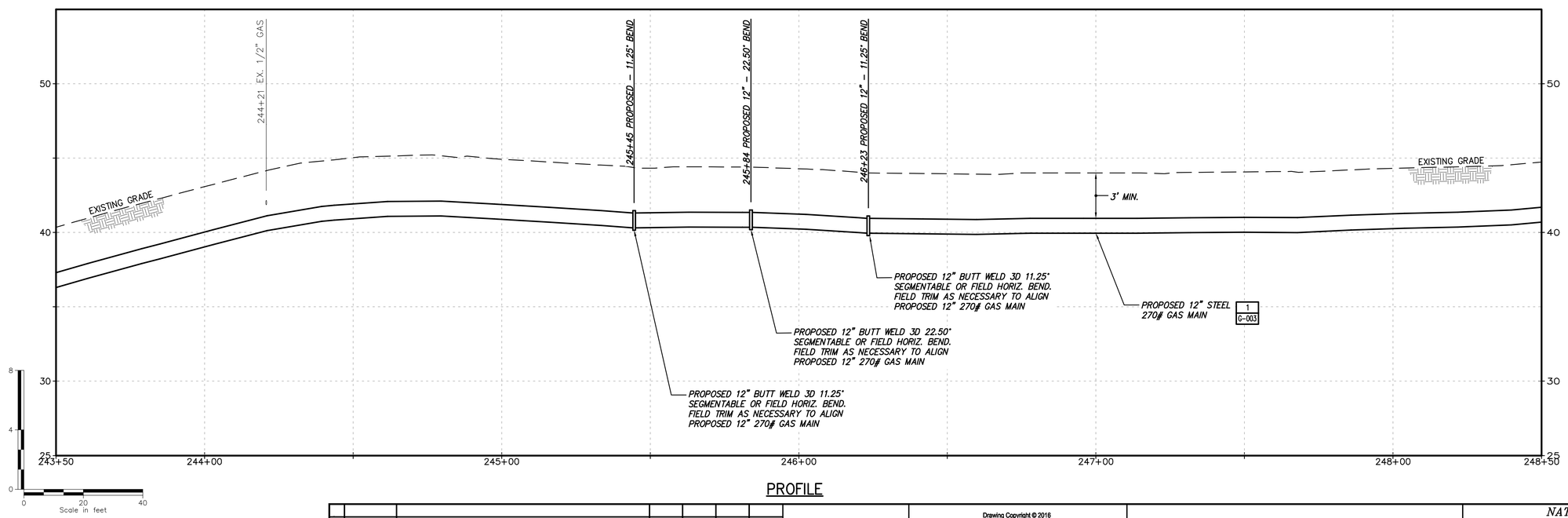
DRAWING NUMBER
C-149

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-149-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-149-29847	SEQUENCE No.	DRAWING NUMBER C-149
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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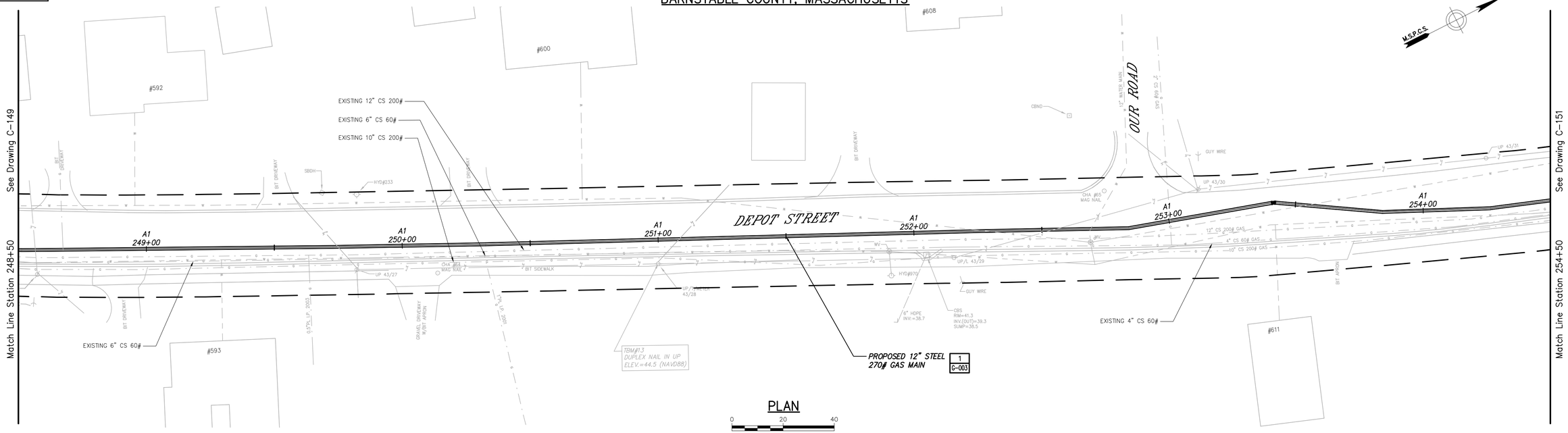
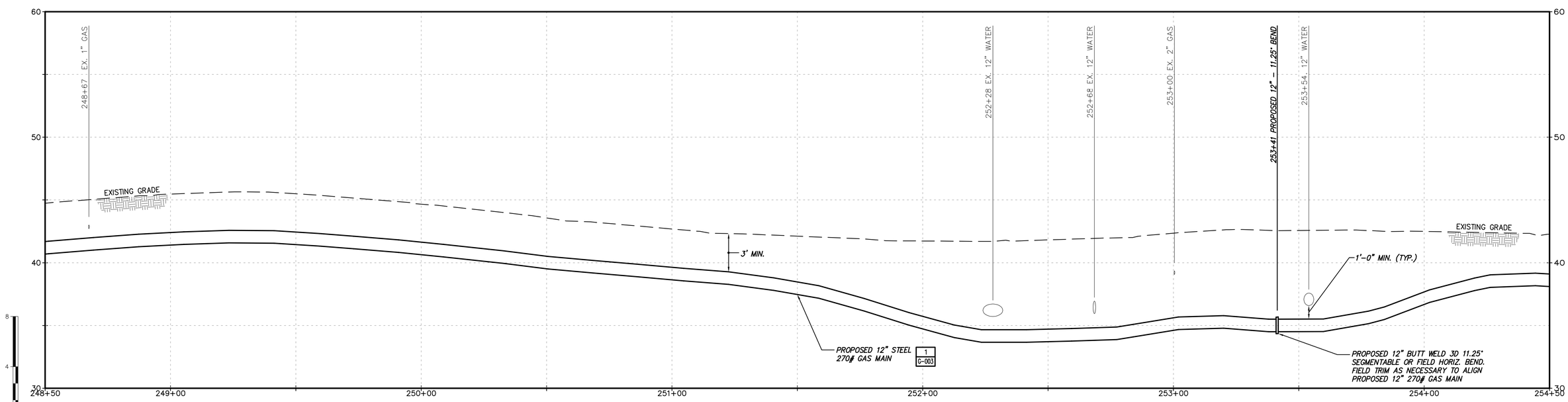
TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Drawn RJT	Date 01/22/2016	Scale AS NOTED
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-150-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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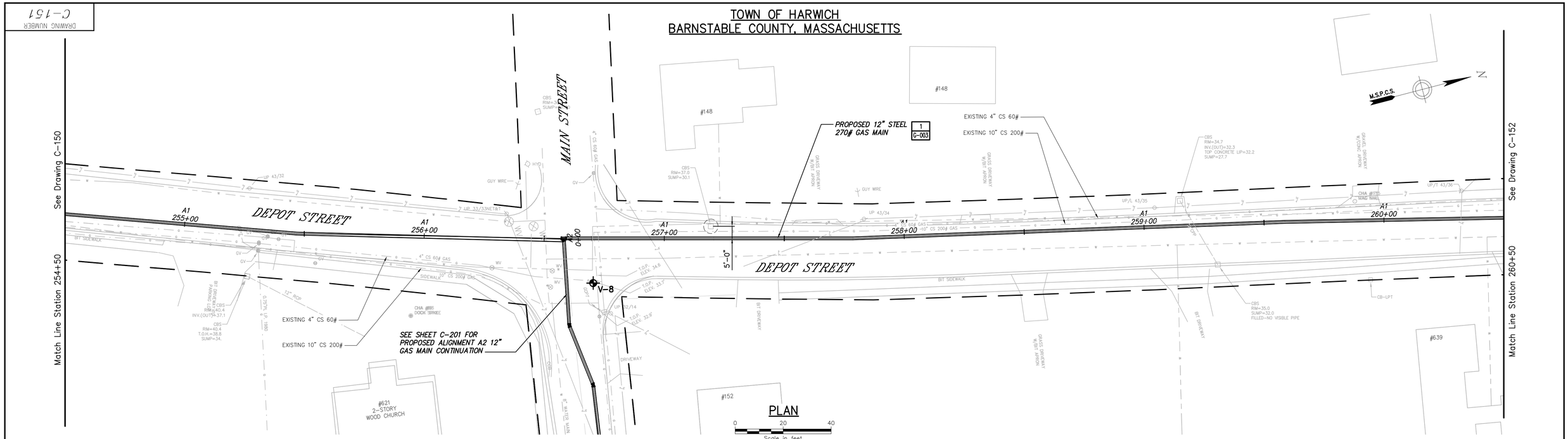
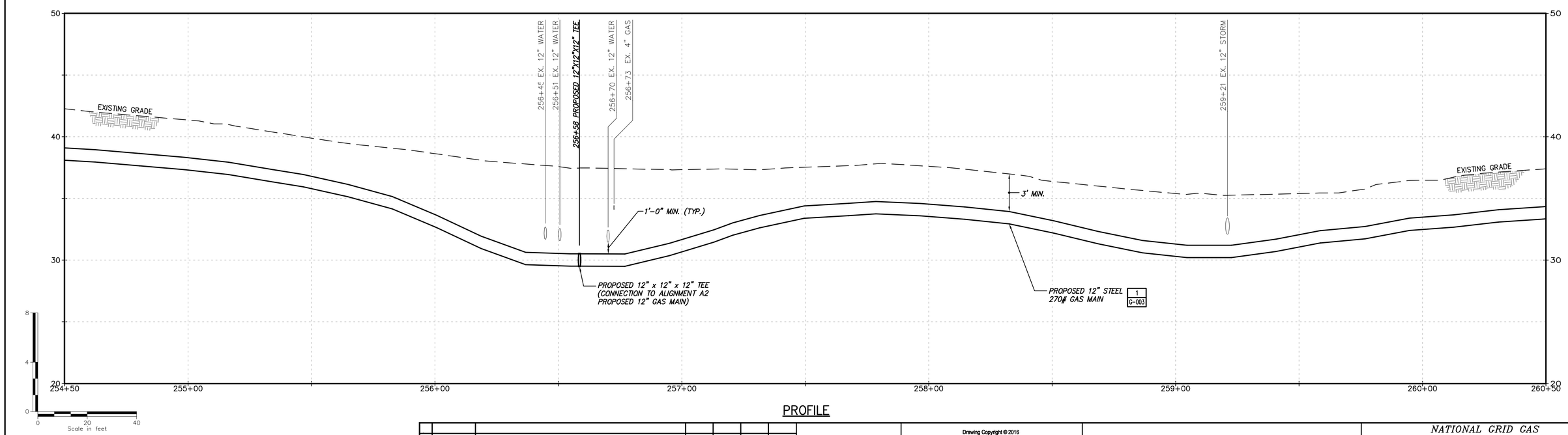
DRAWING NUMBER C-151

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-151-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-151-29847		C-151

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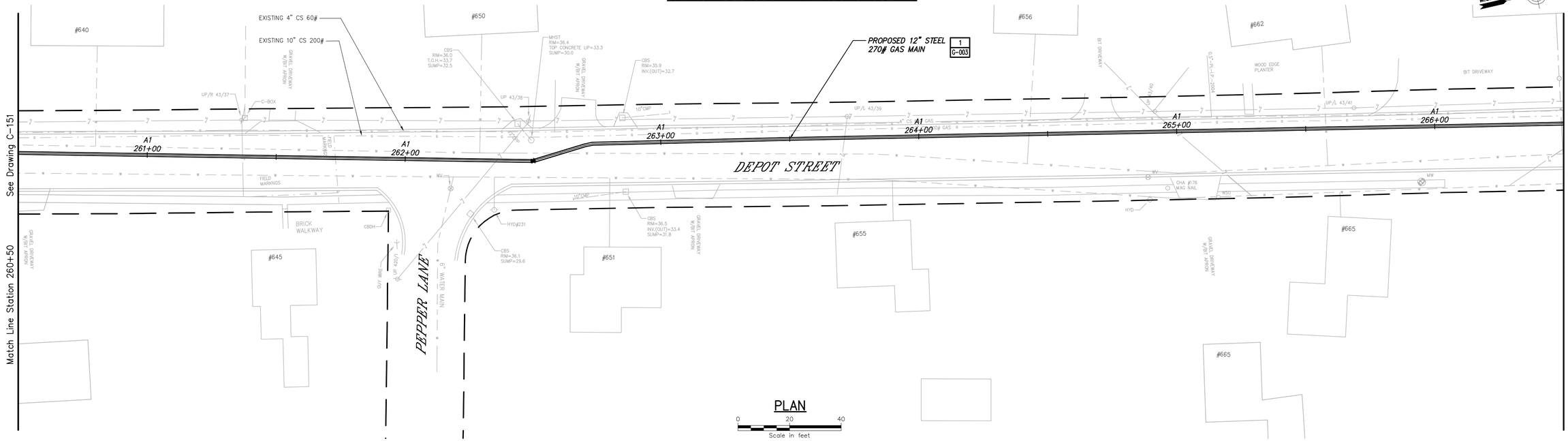
DRAWING NUMBER C-152

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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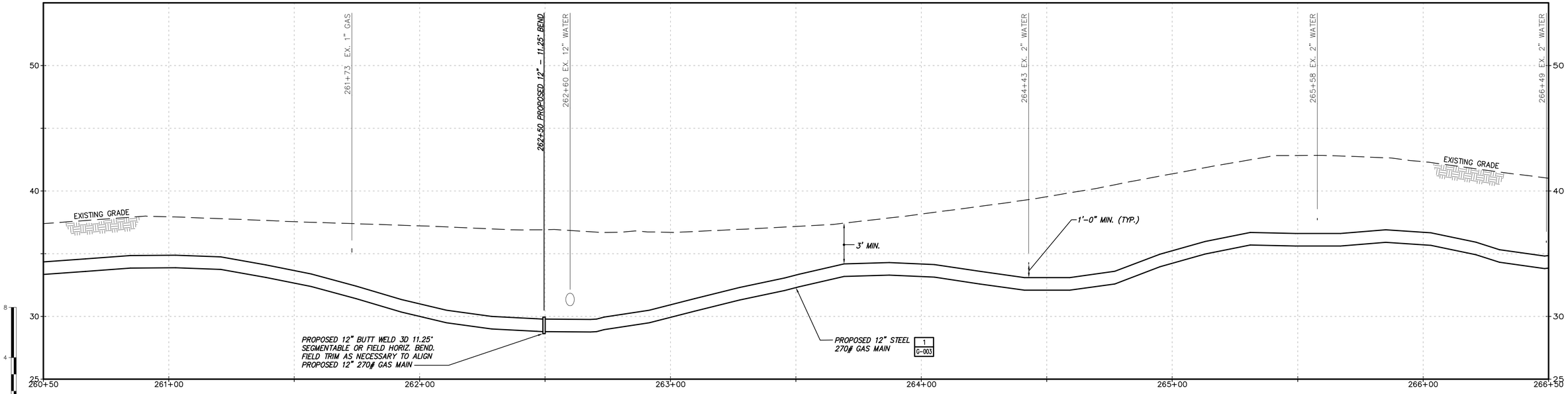
Scale in feet



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Chkd. BCK	Design Engr. CEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-152-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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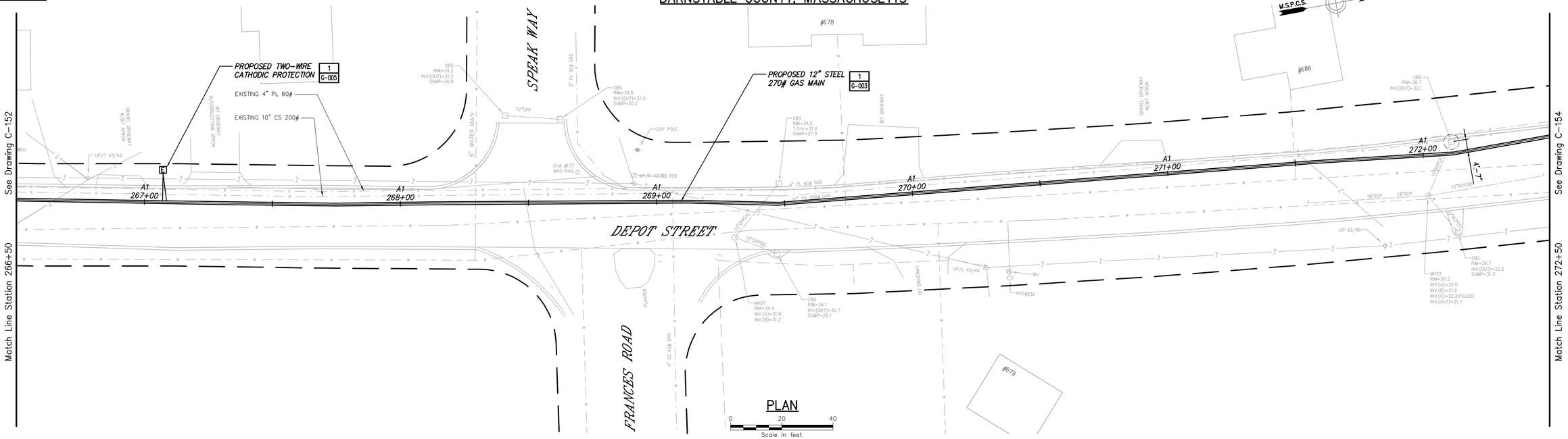
DRAWING NUMBER C-153

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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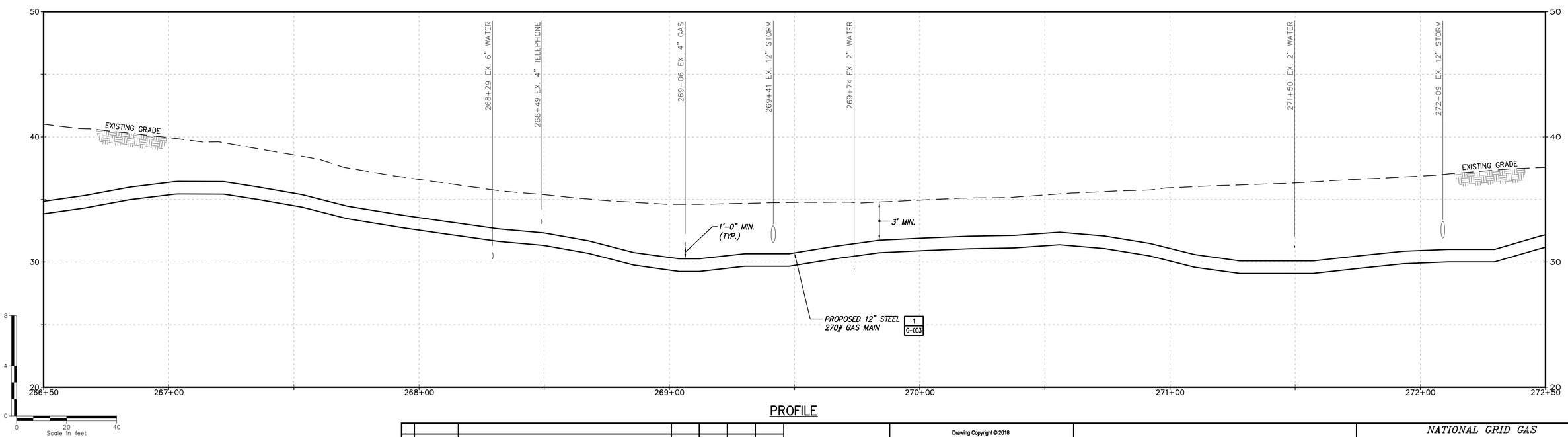

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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	CEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-153-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-153-29847	SEQUENCE No.	DRAWING NUMBER C-153
Chkd. BCK	Design Engr. CEW	Design Supv. JEO			

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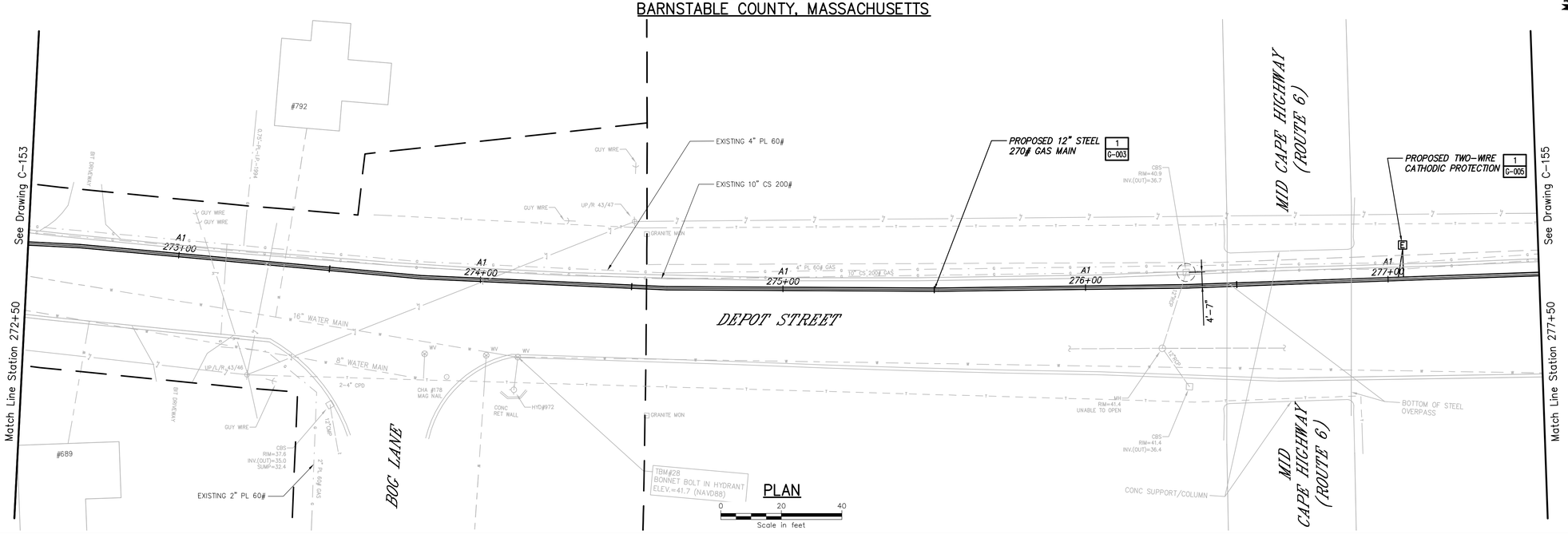
DRAWING NUMBER
C-154

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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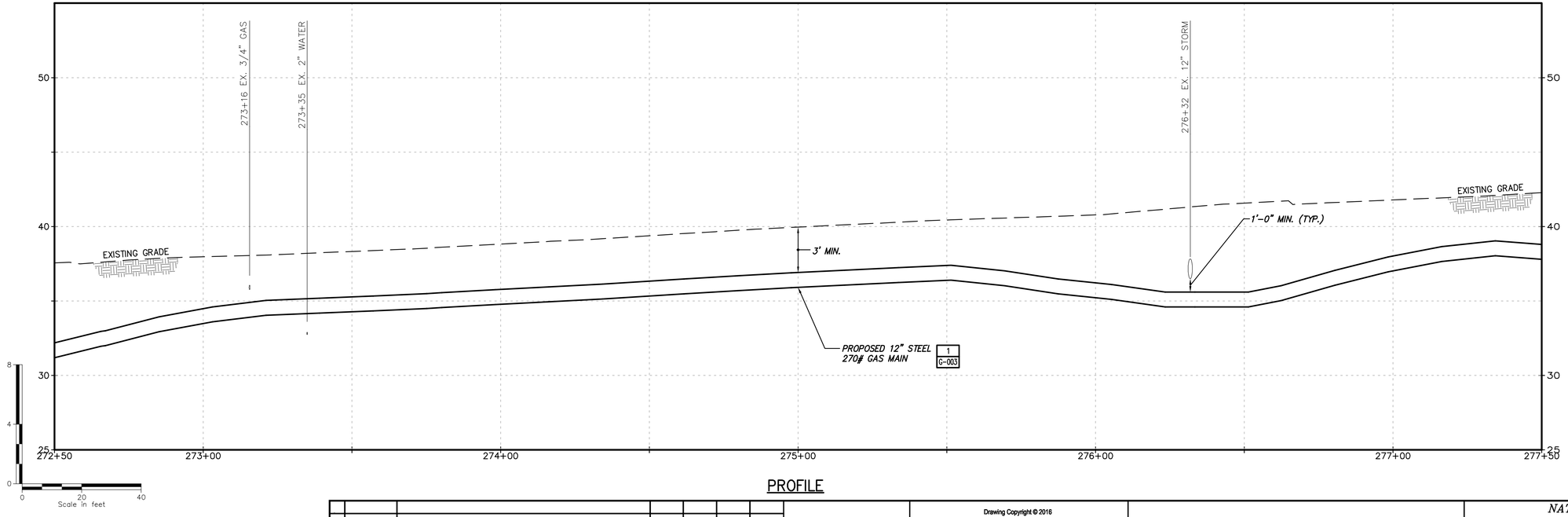

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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-154-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-154-29847		C-154

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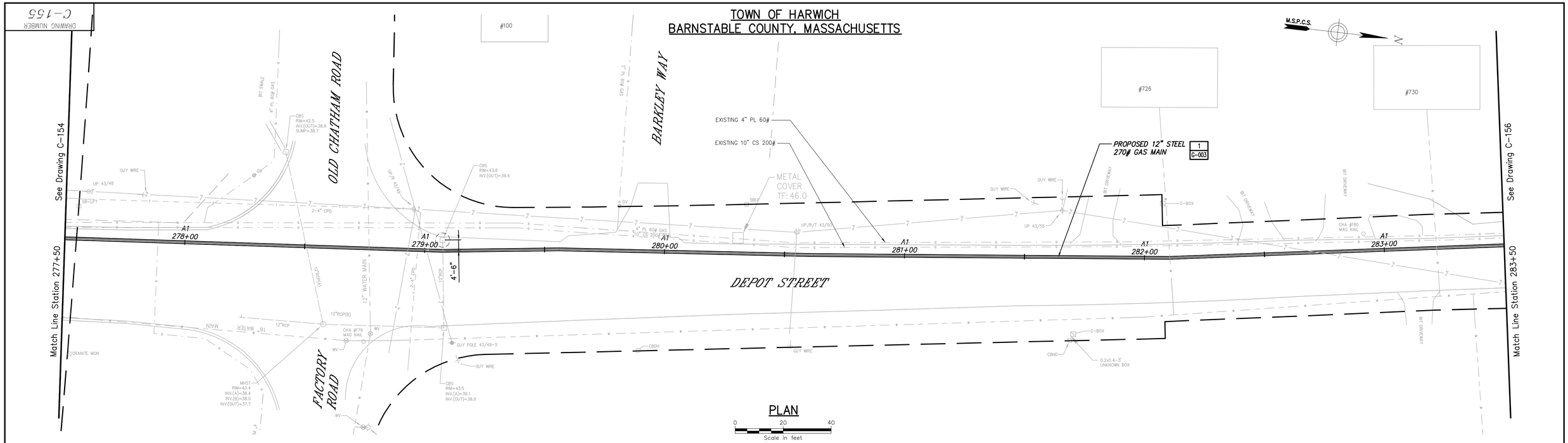
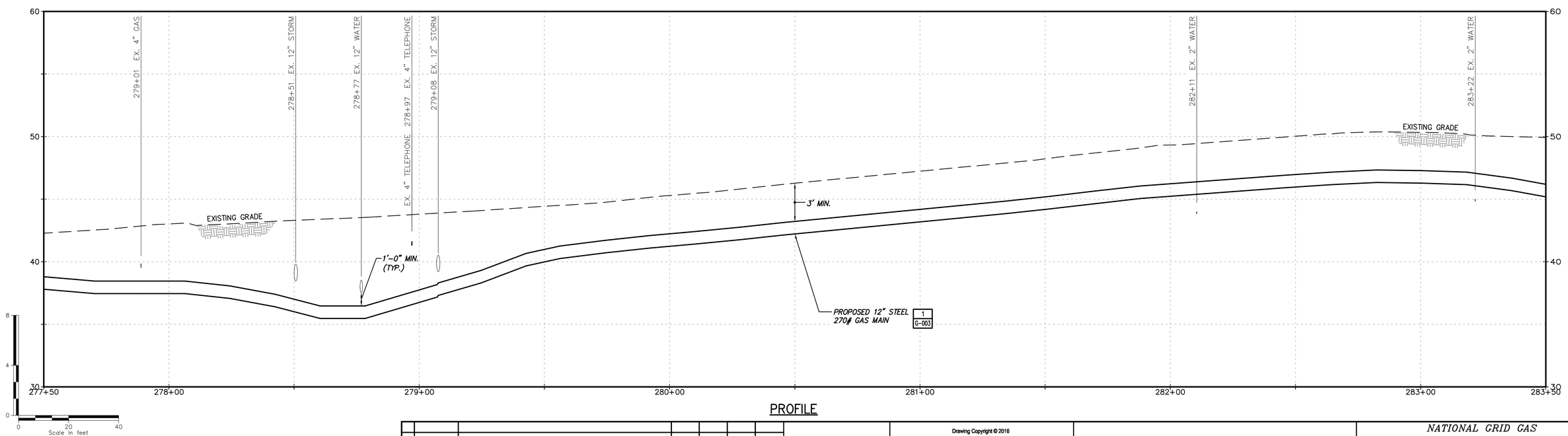
DRAWING NUMBER C-155

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-155-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-155-29847		C-155

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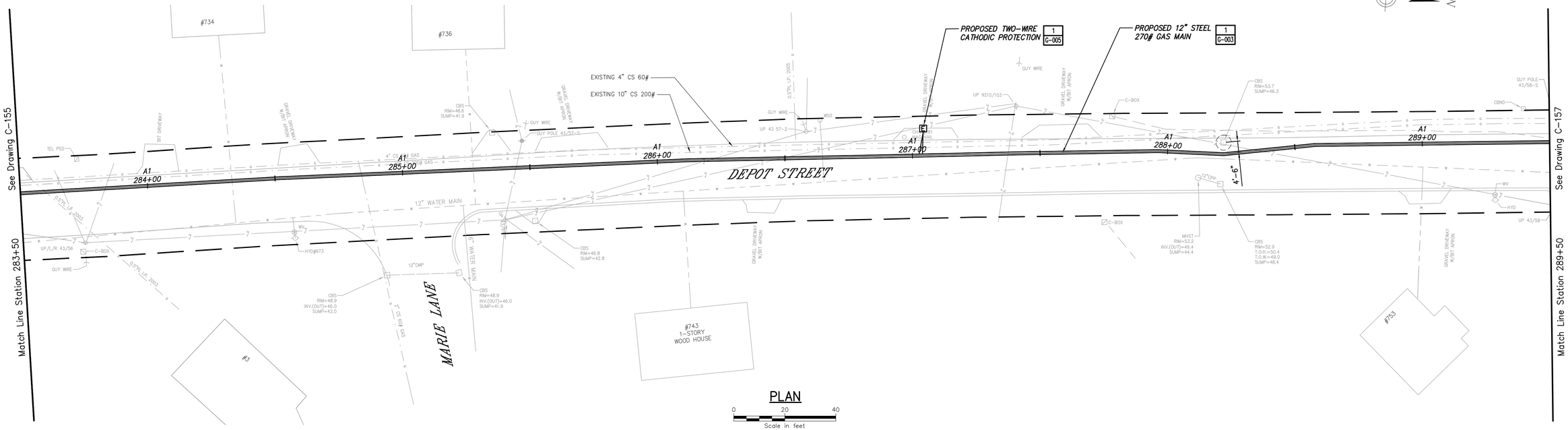
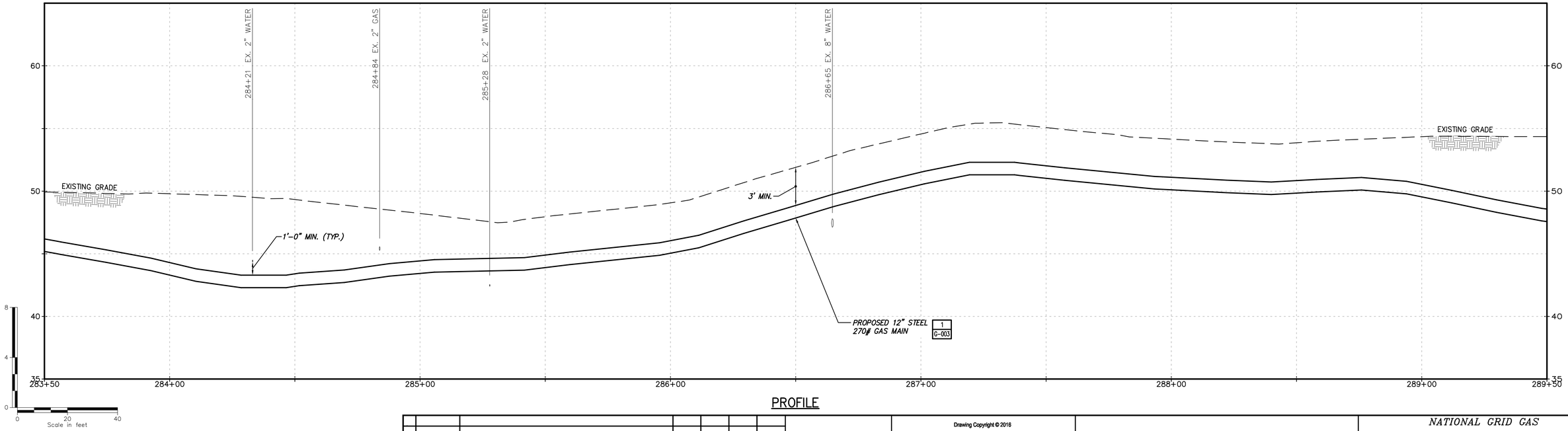
DRAWING NUMBER C-156

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-156-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-156-29847		C-156

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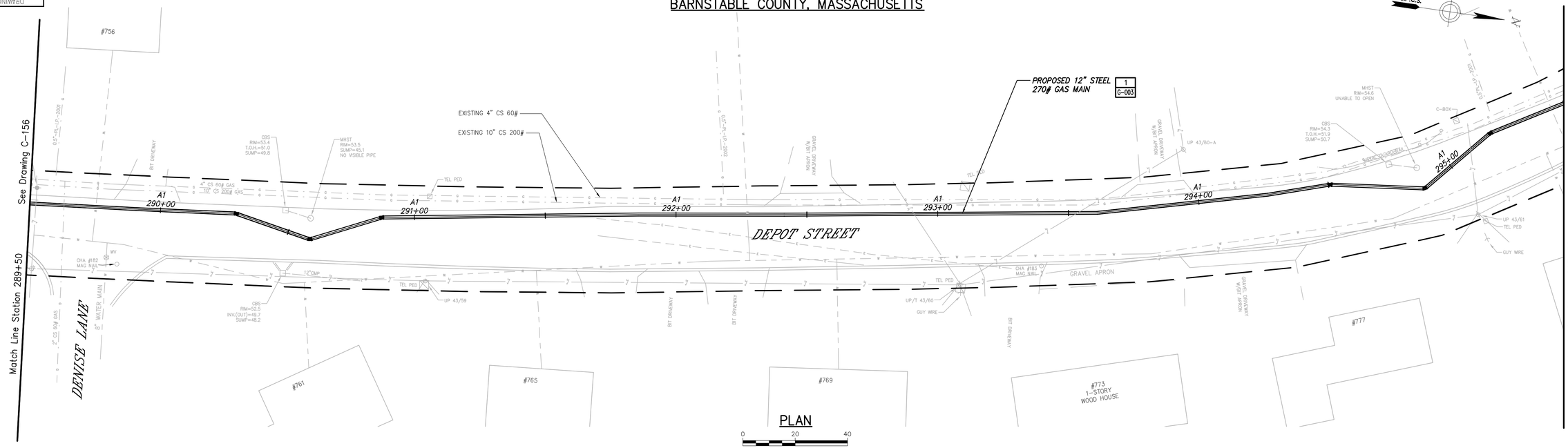
DRAWING NUMBER
C-157

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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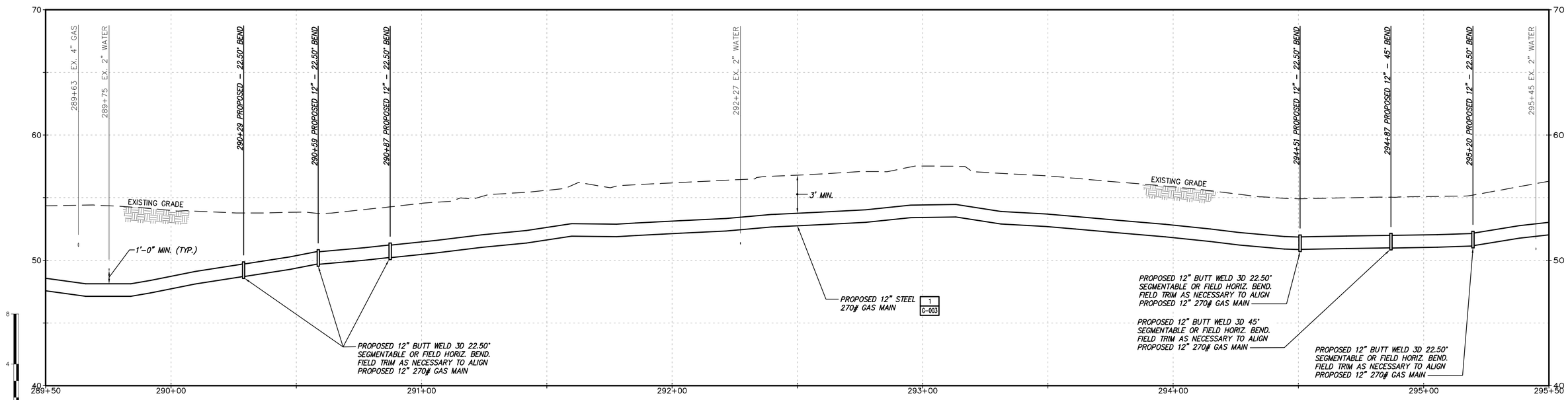
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-157-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-157-29847		C-157

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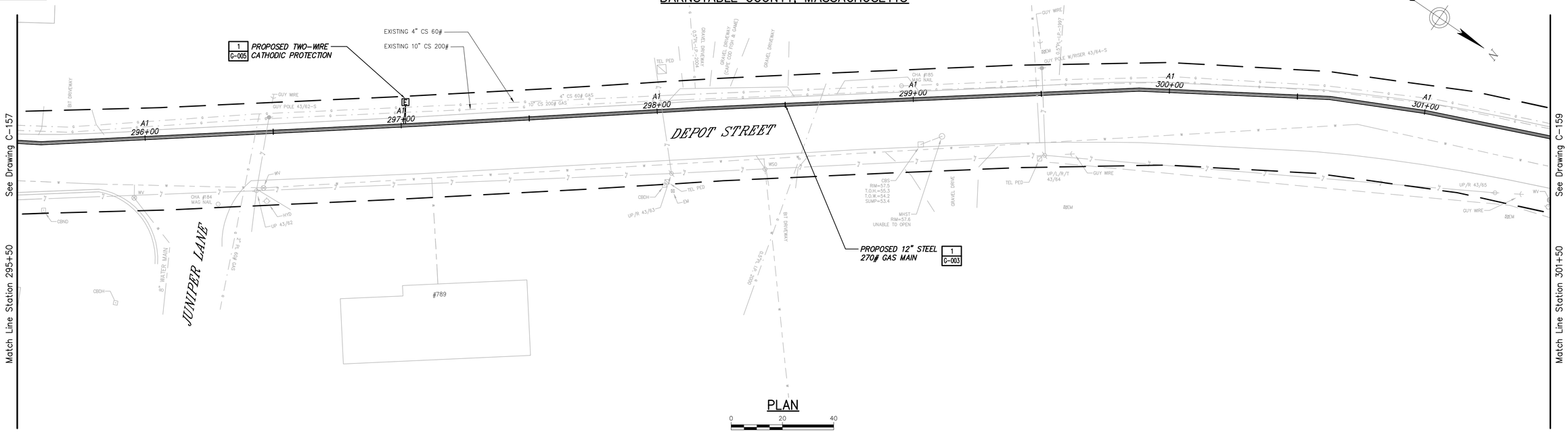
DRAWING NUMBER C-158

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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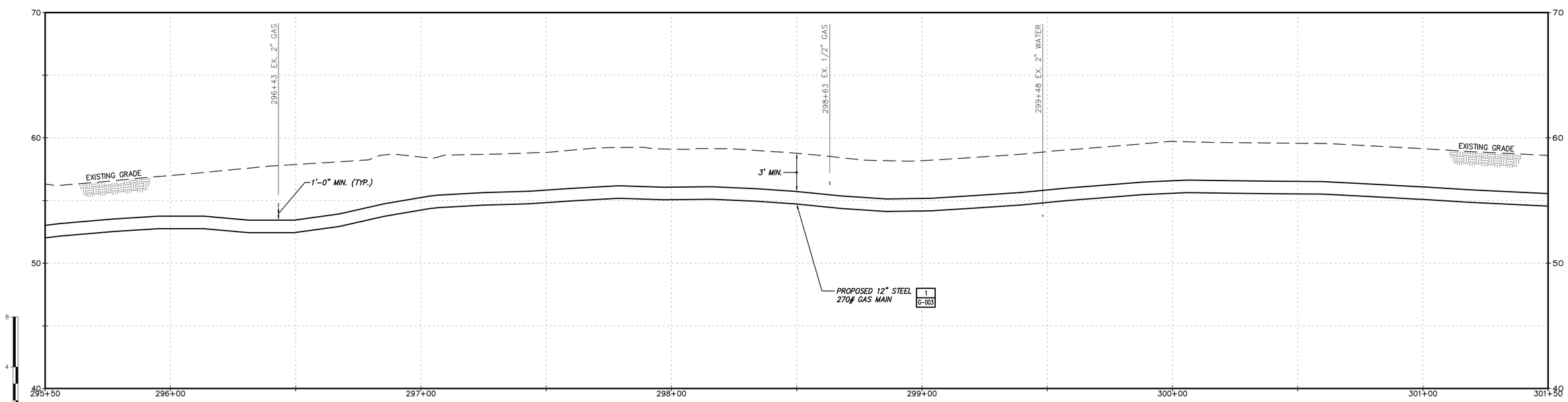
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-158-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-158-29847		C-158

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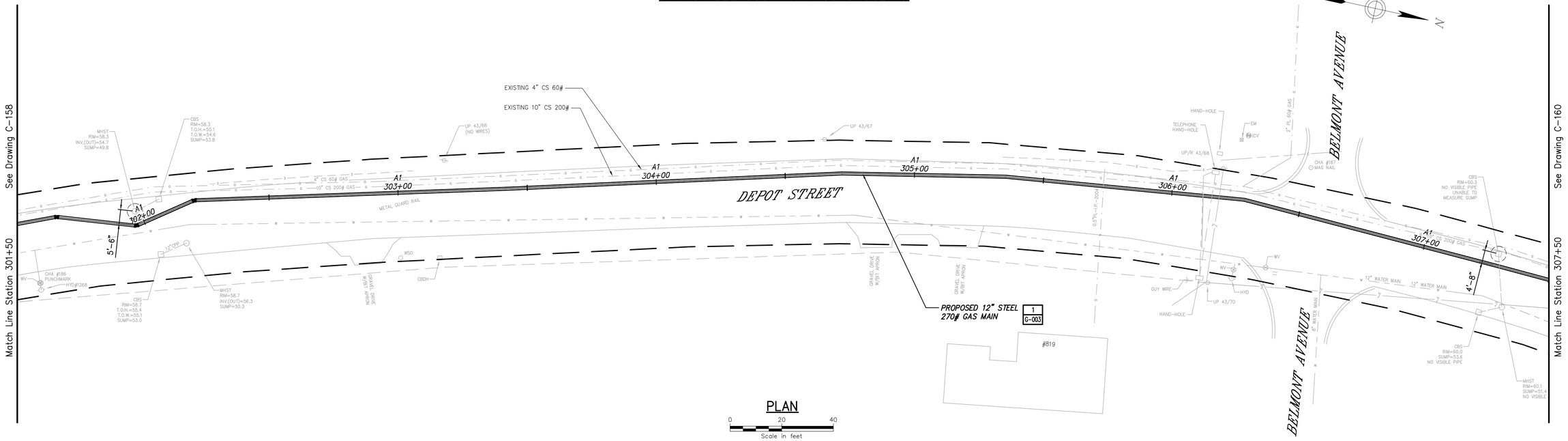
DRAWING NUMBER C-159

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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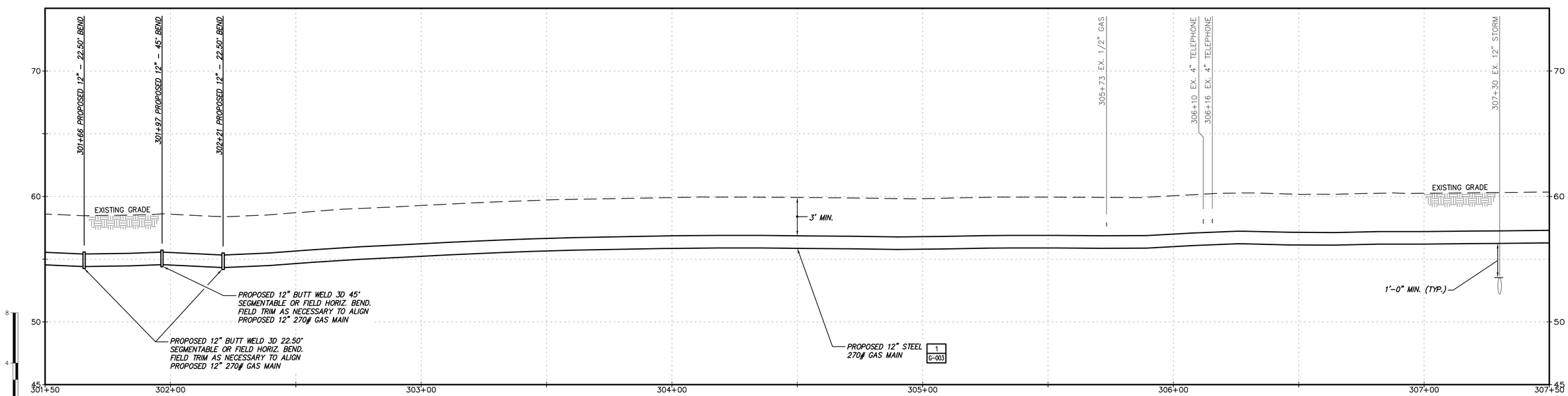
Scale in feet



PROFILE

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Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-159-29847

CAD FILE NAME: C-159-29847
SEQUENCE No.:
DRAWING NUMBER: C-159

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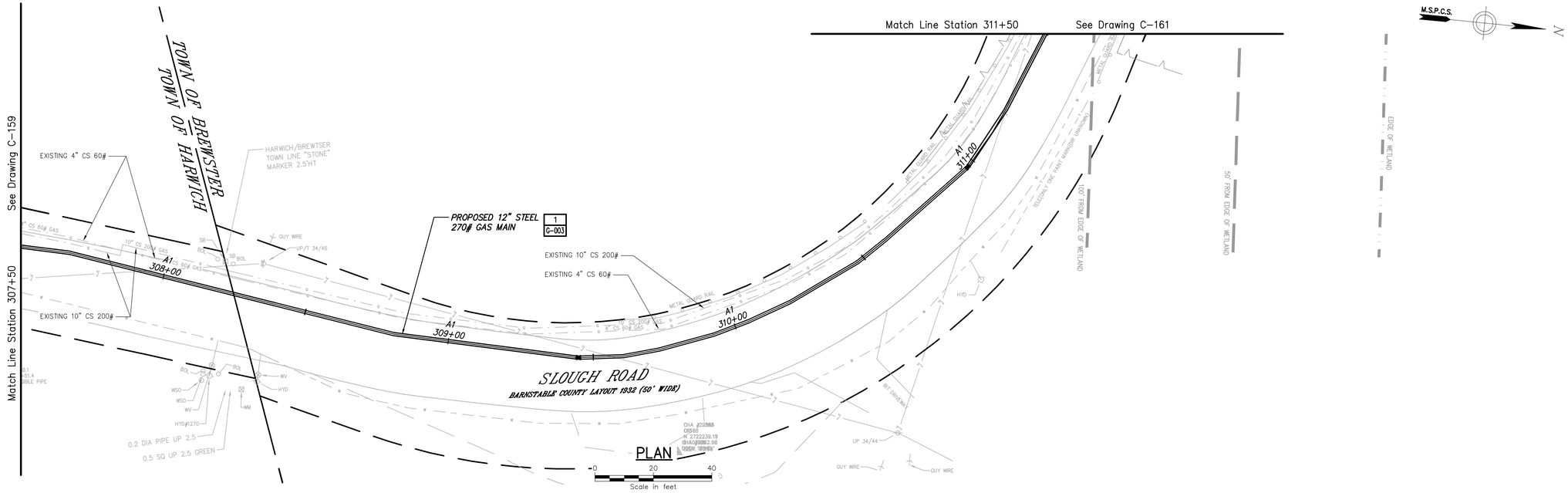
DRAWING NUMBER C-160

TOWNS OF HARWICH & BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



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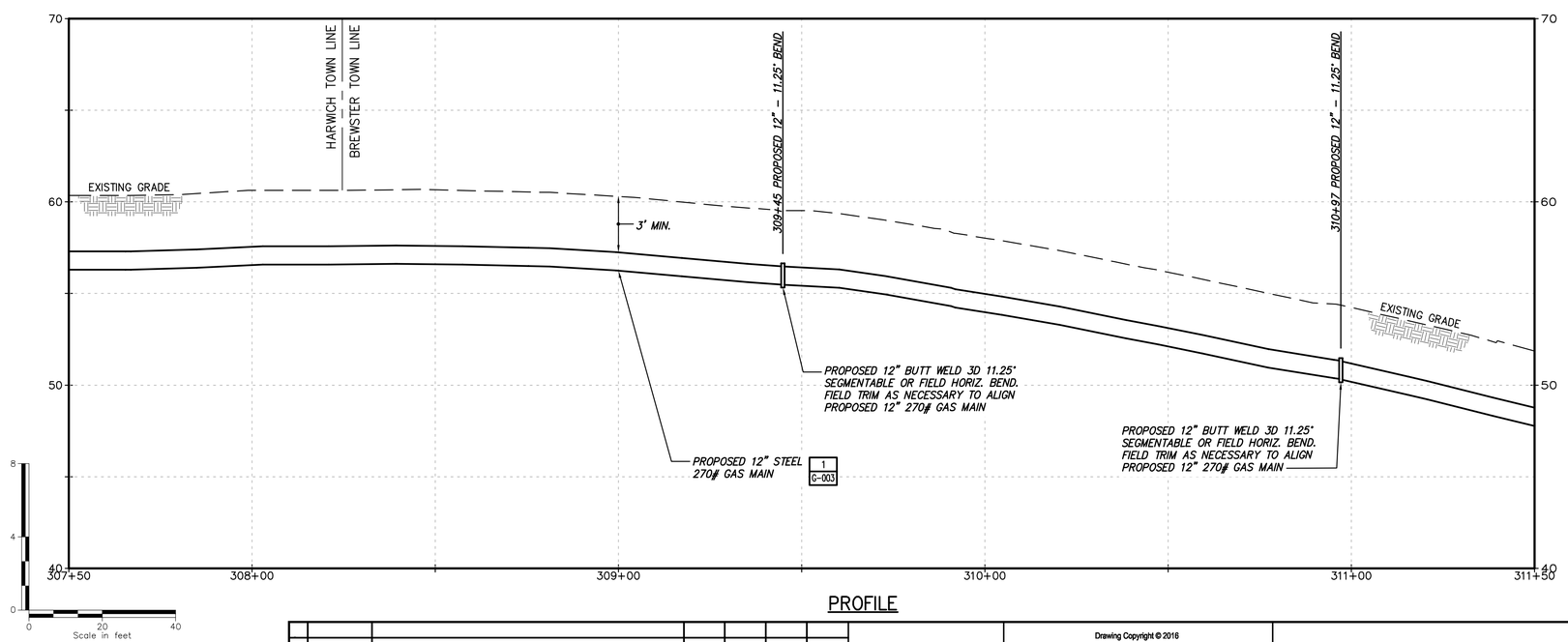

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-160-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-160-29847		C-160

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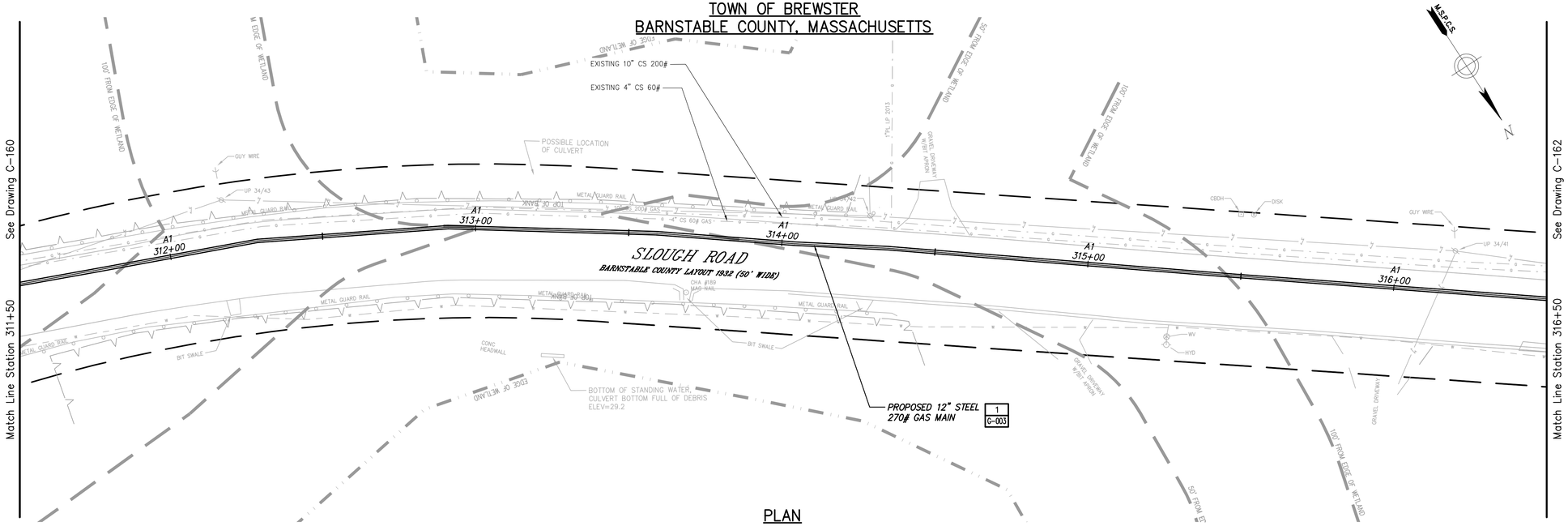
DRAWING NUMBER
C-161

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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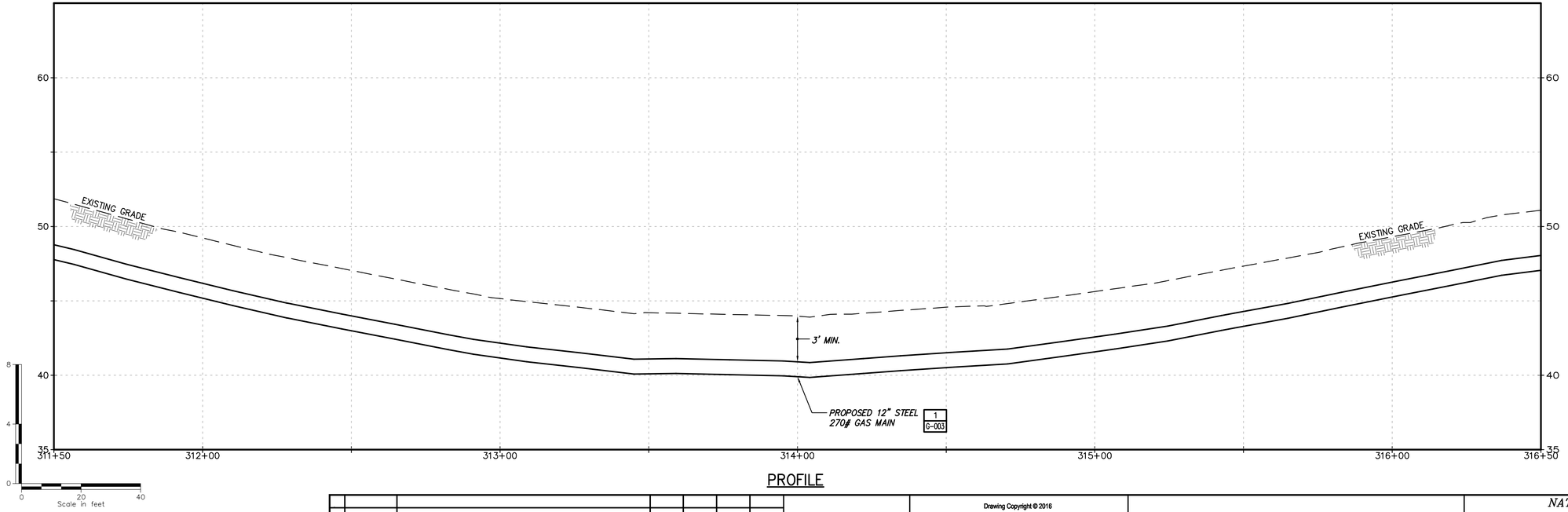
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-161-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-161-29847		C-161

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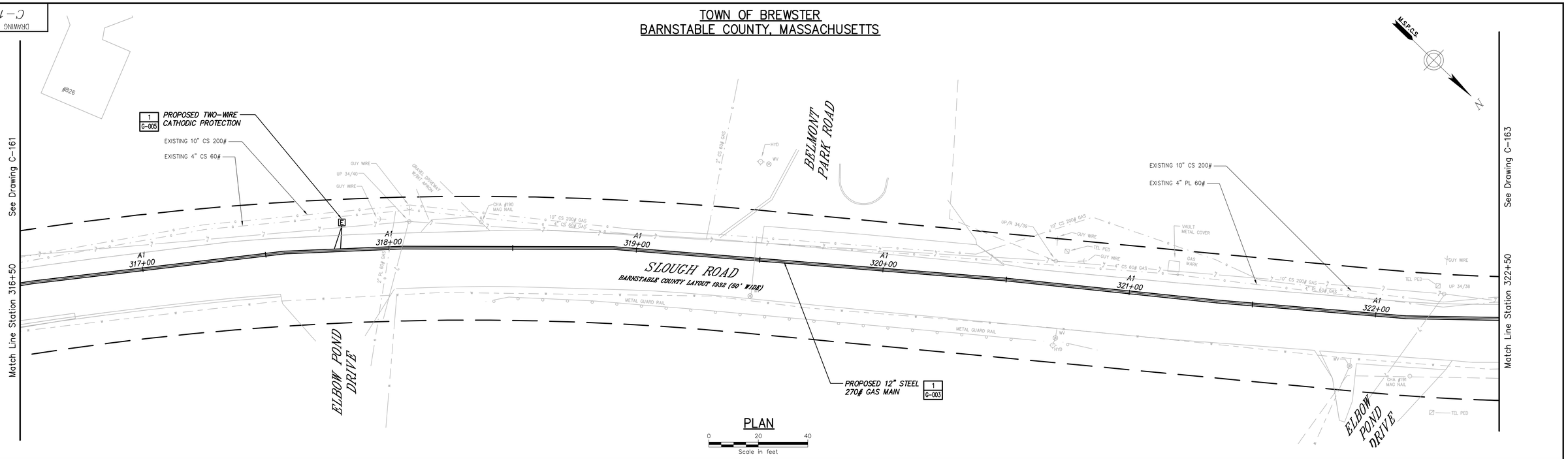
DRAWING NUMBER C-162

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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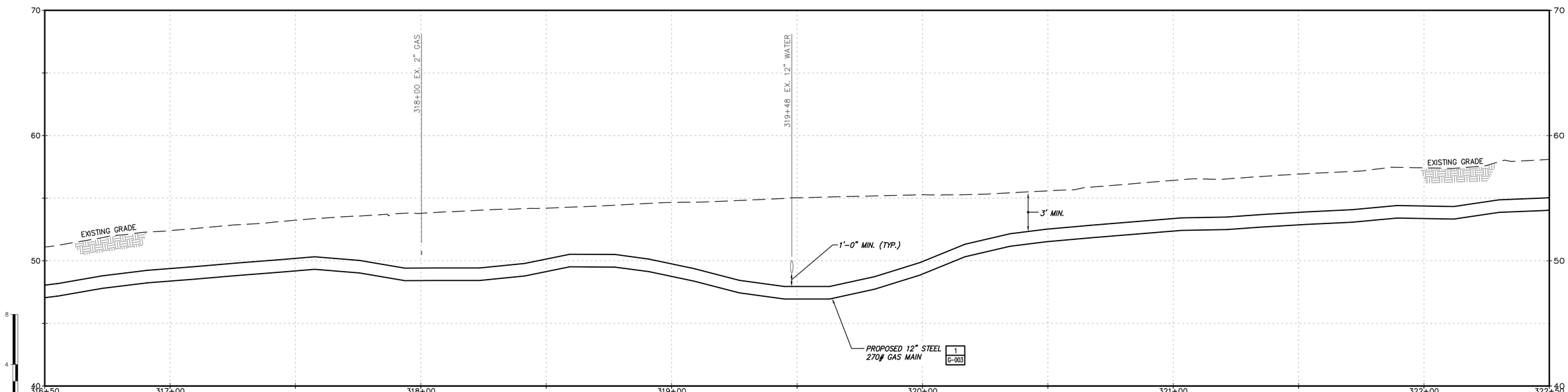
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-162-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-162-29847		C-162

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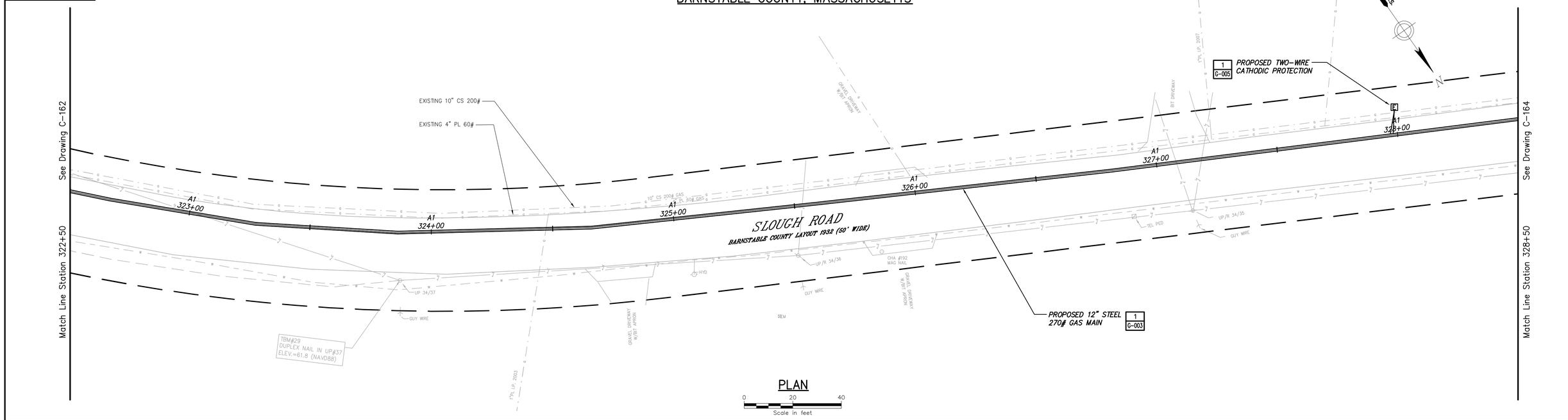
DRAWING NUMBER C-163

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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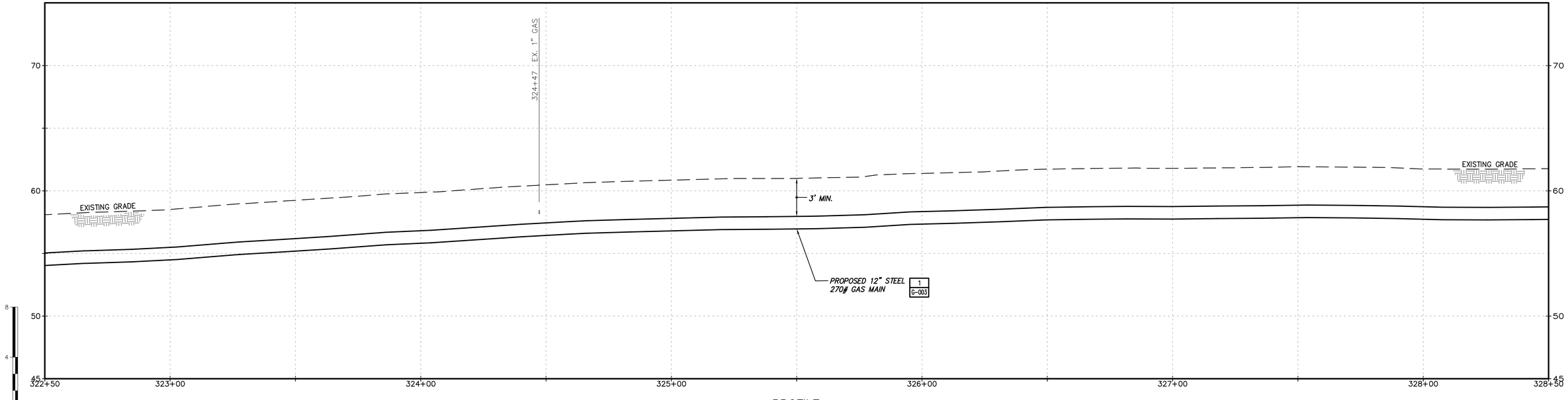
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-163-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-163-29847		C-163

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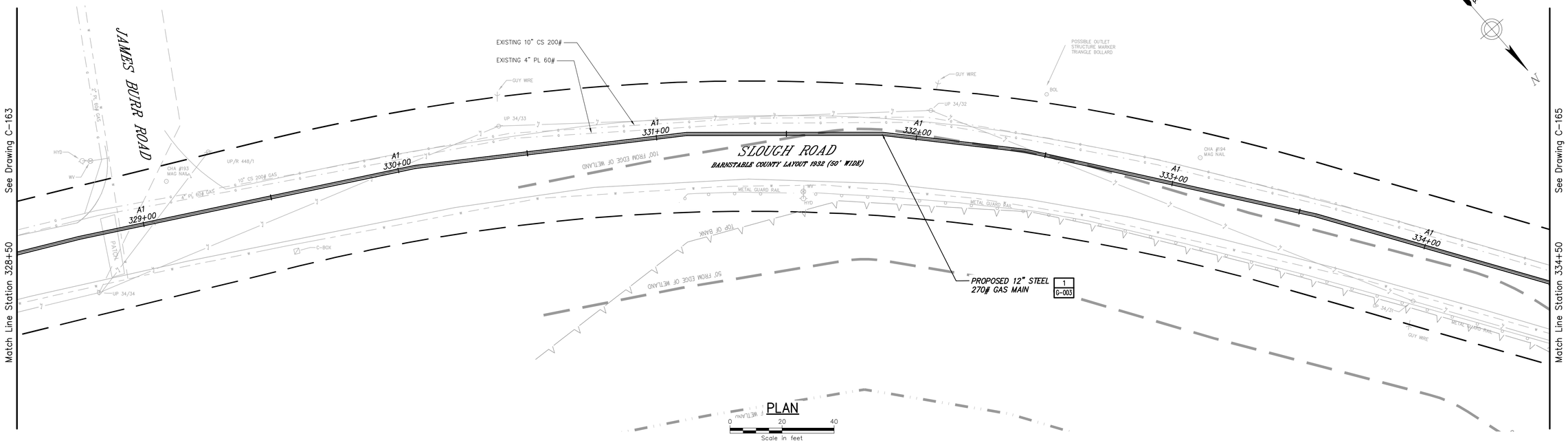
C-164

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



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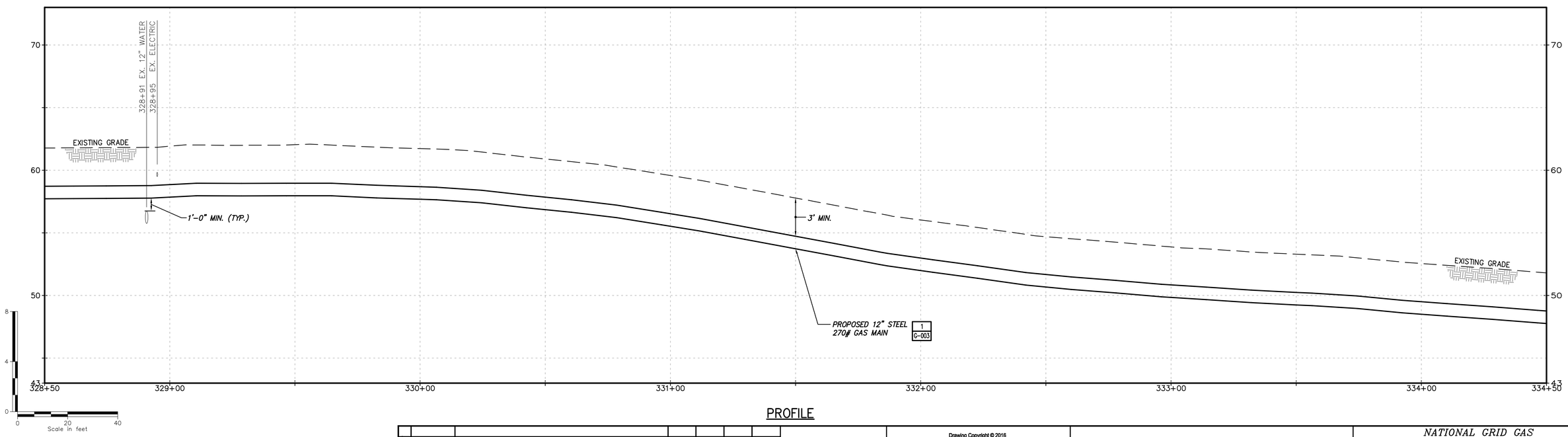

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-164-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-164-29847		C-164

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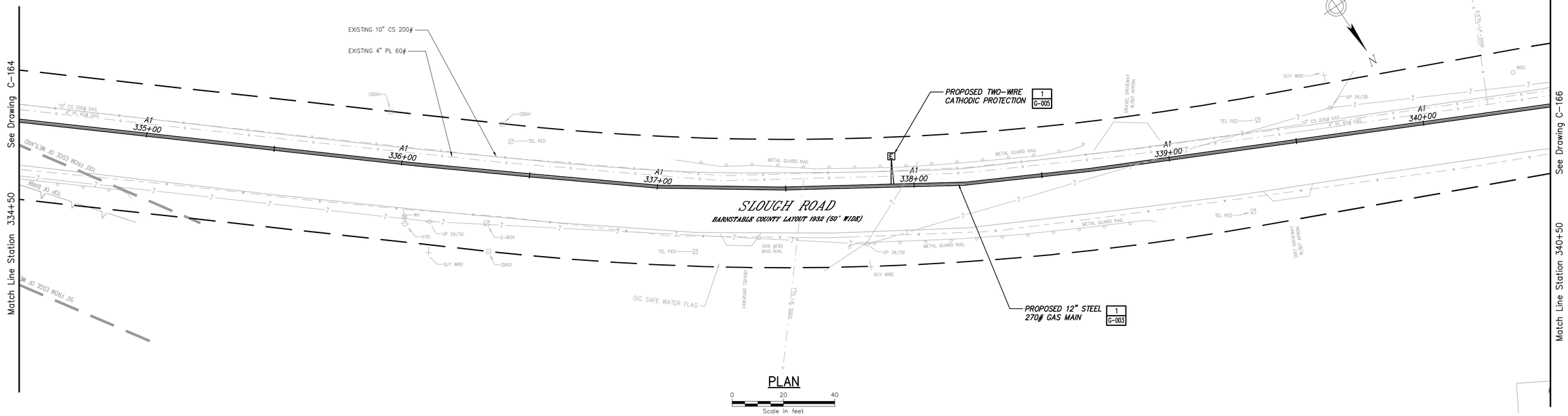
DRAWING NUMBER C-165

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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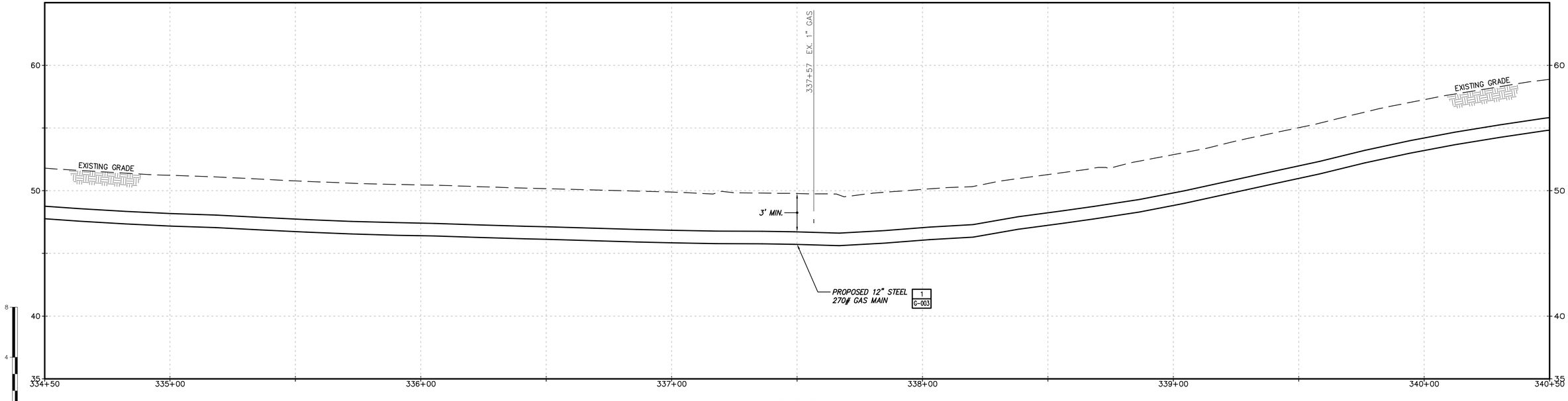
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-165-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-165-29847		C-165

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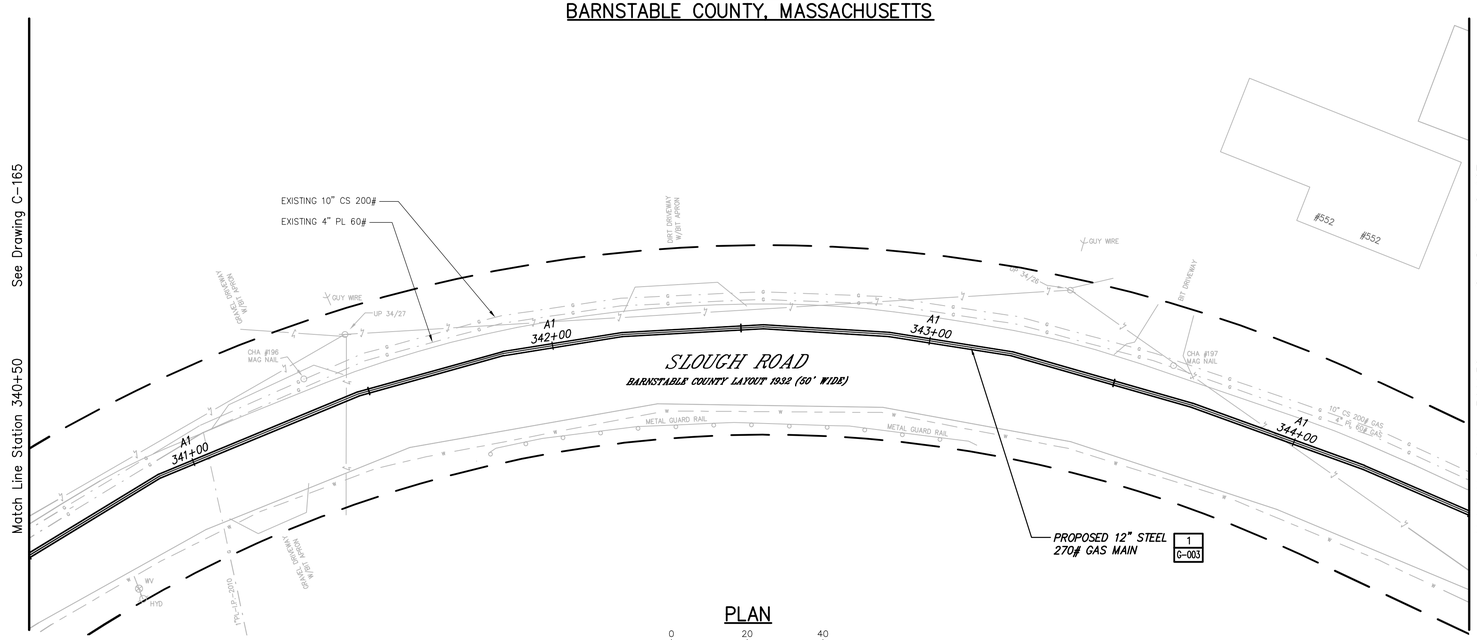
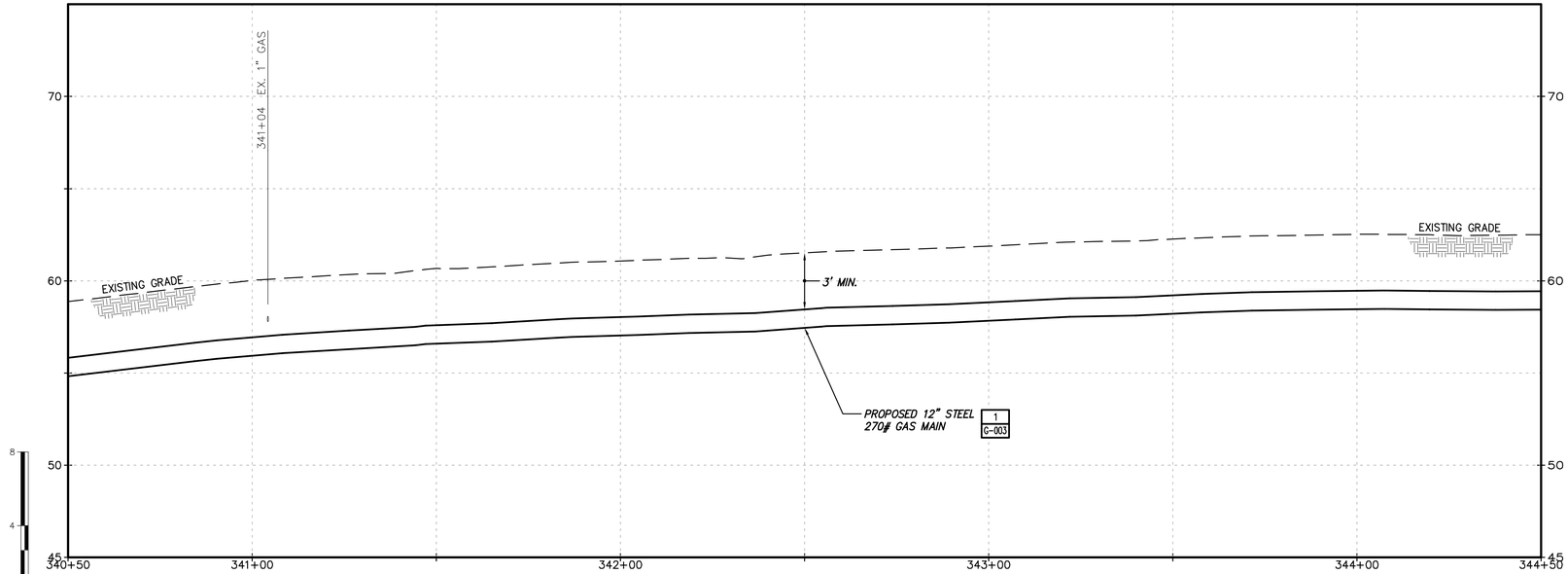
DRAWING NUMBER
C-166

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

8
4
0
0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-166-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-166-29847		C-166

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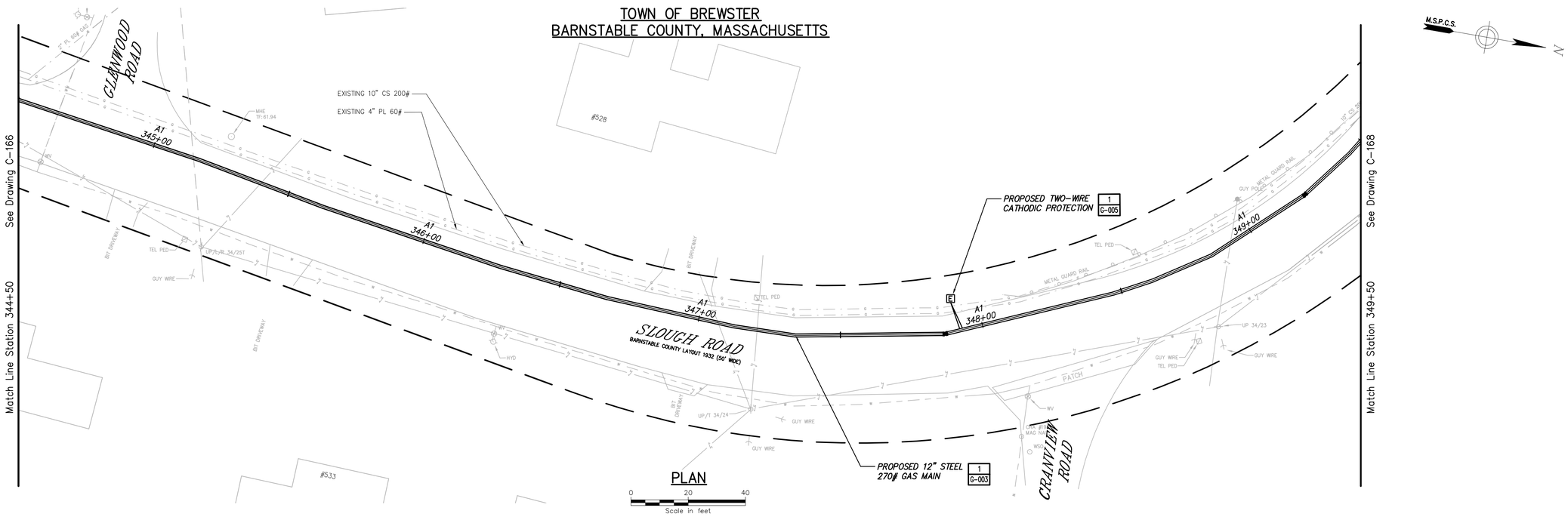
DRAWING NUMBER C-167

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



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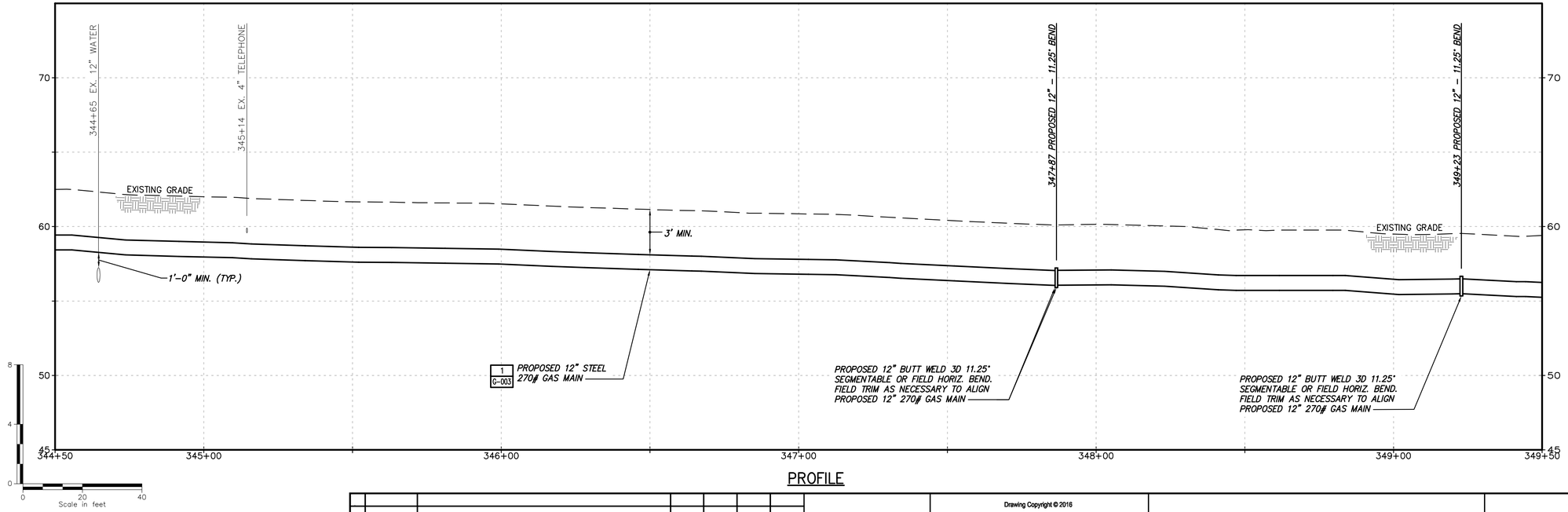

PROFILE

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NATIONAL GRID GAS

MID-CAPE MAIN REPLACEMENT

CONSTRUCTION DRAWINGS

C-167-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-167-29847		C-167

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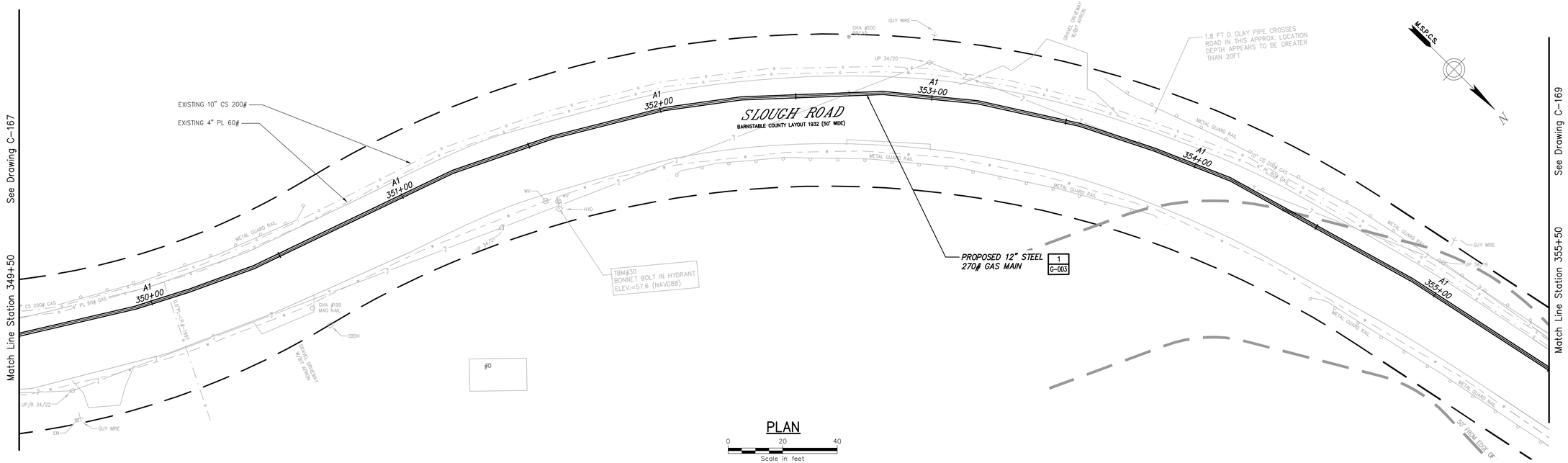
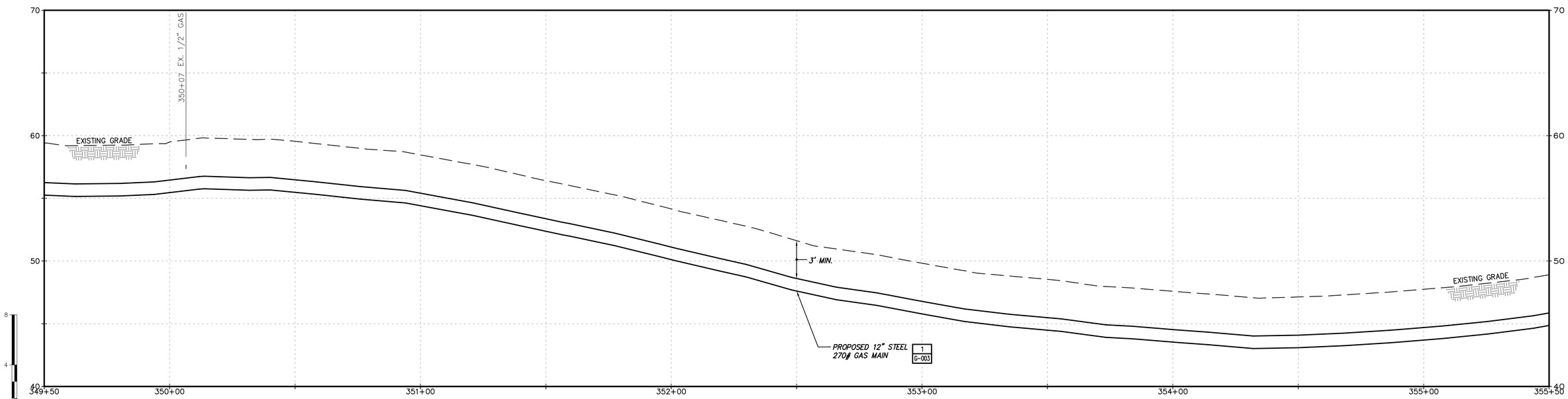
DRAWING NUMBER
C-168

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-168-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-168-29847		C-168

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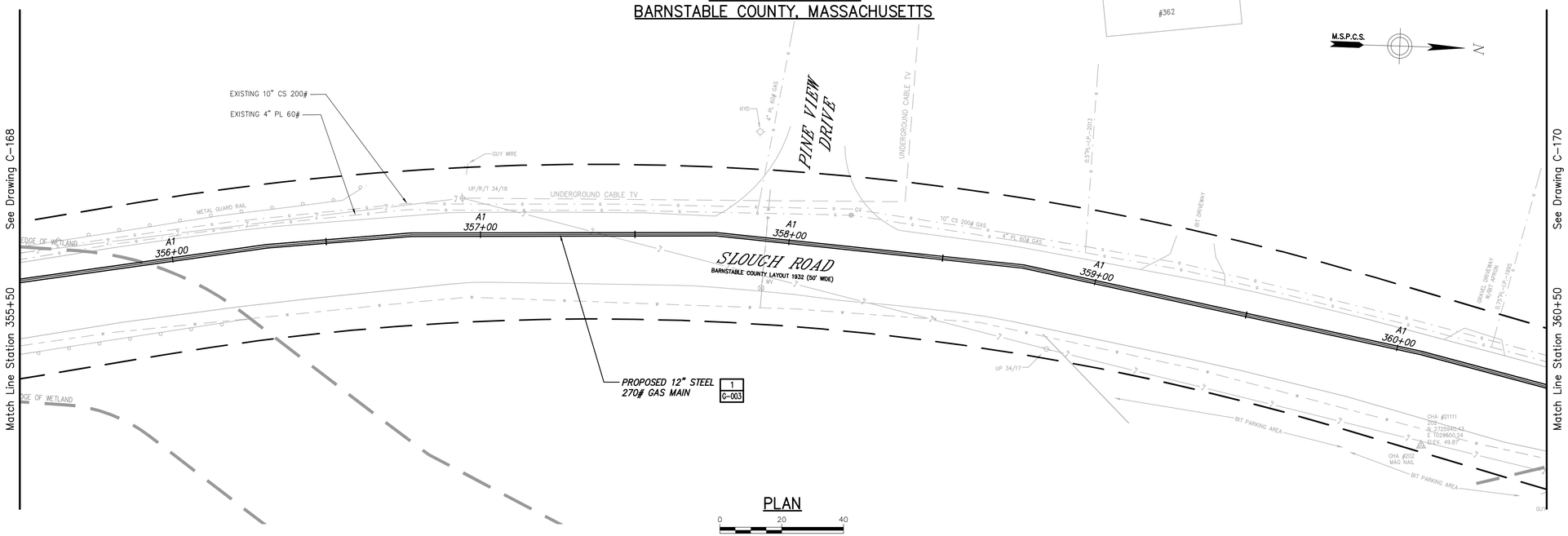
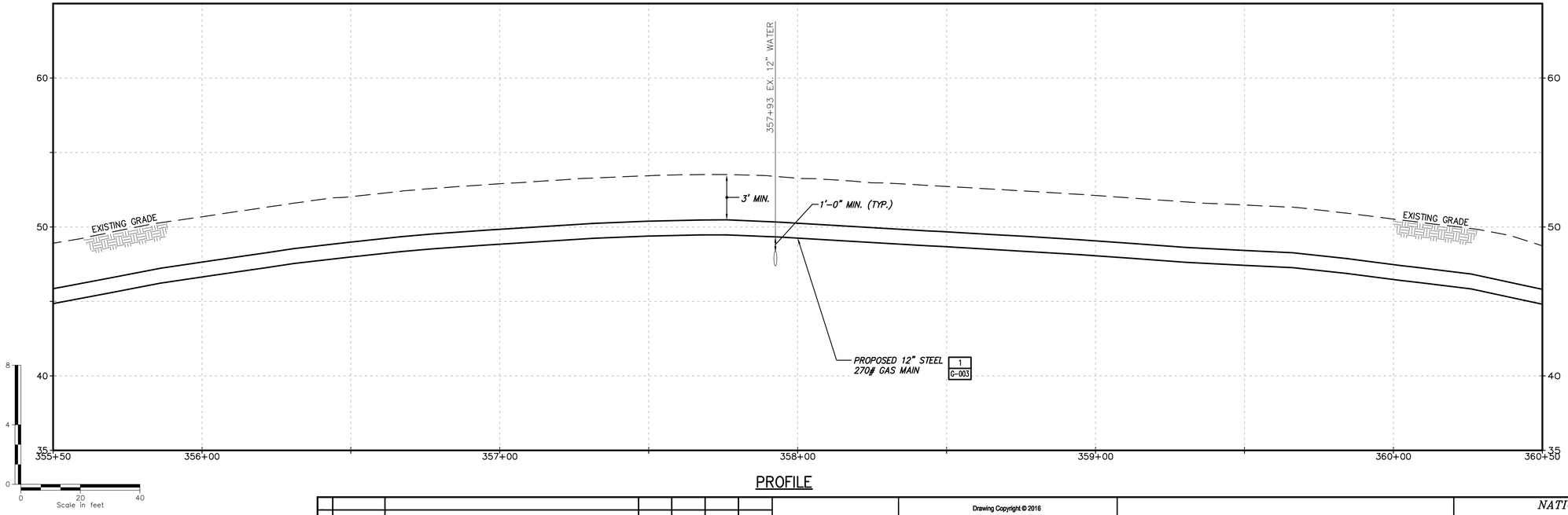
DRAWING NUMBER
C-169

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-169-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-169-29847		C-169

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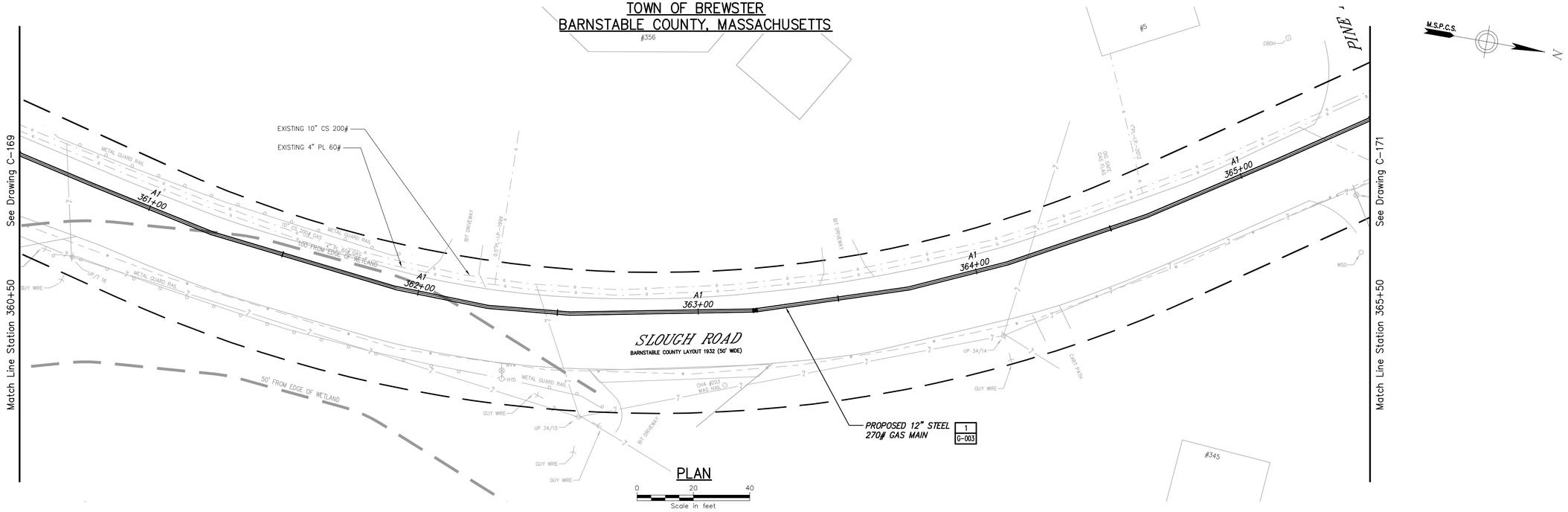
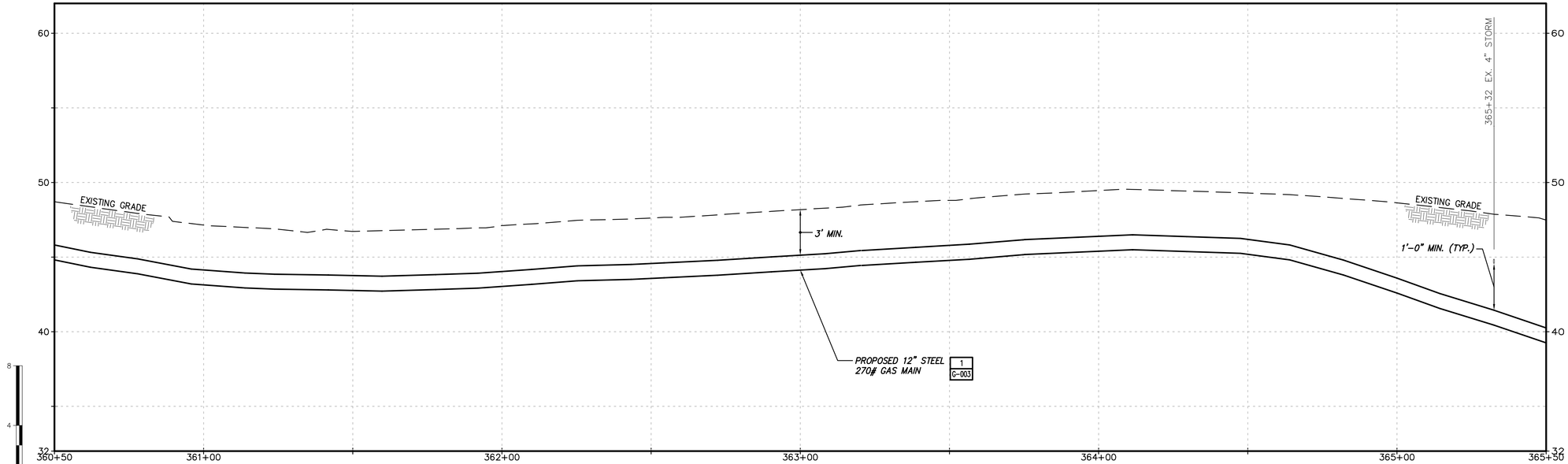
DRAWING NUMBER C-170

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-170-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-170-29847		C-170

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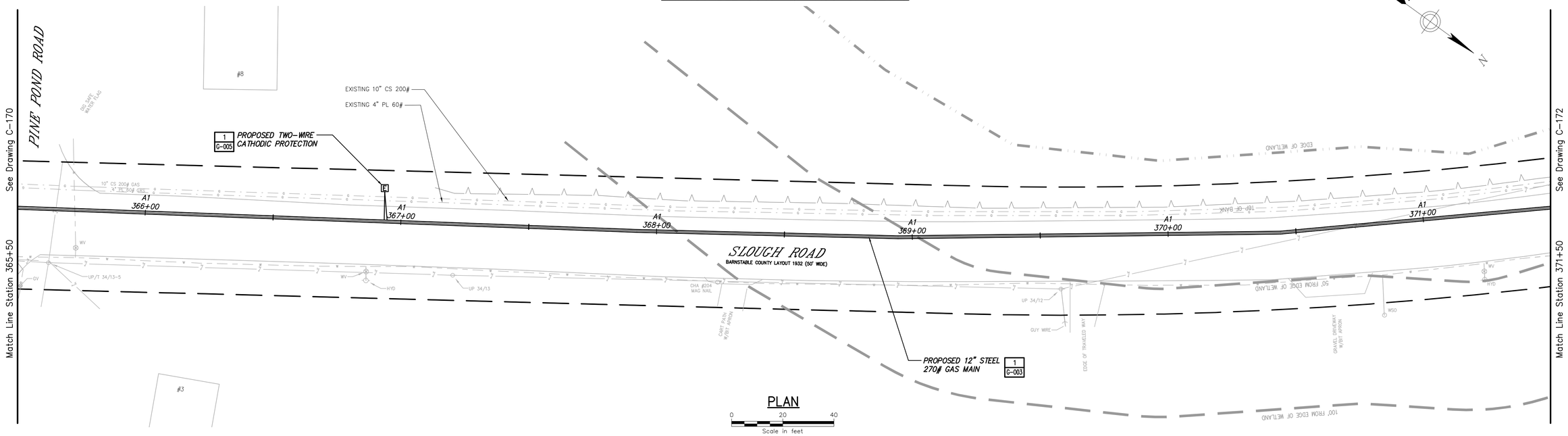
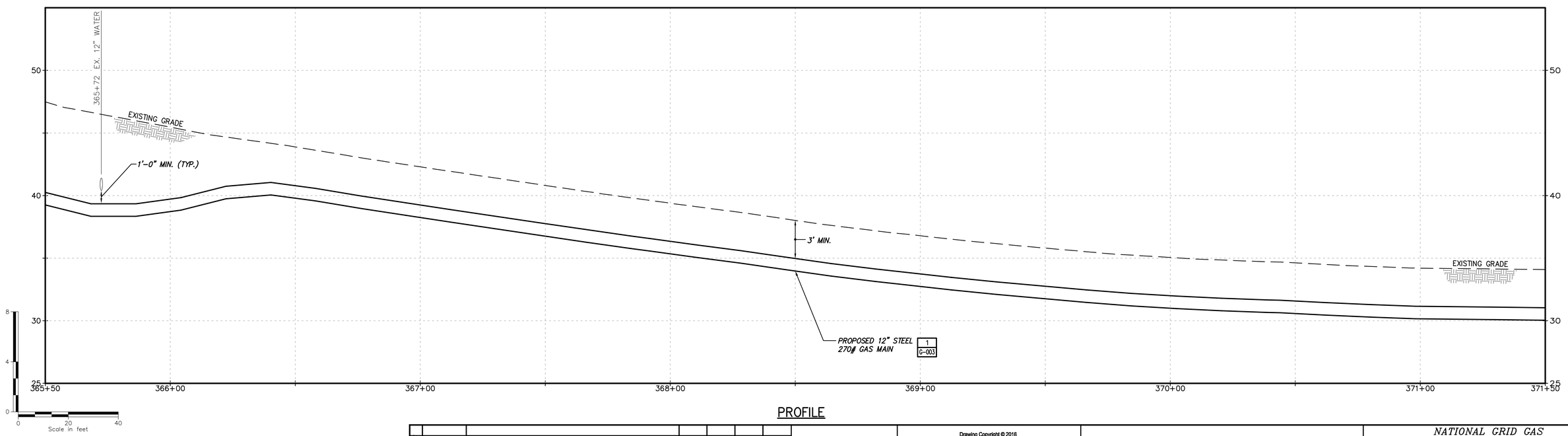
DRAWING NUMBER C-171

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-171-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-171-29847		C-171

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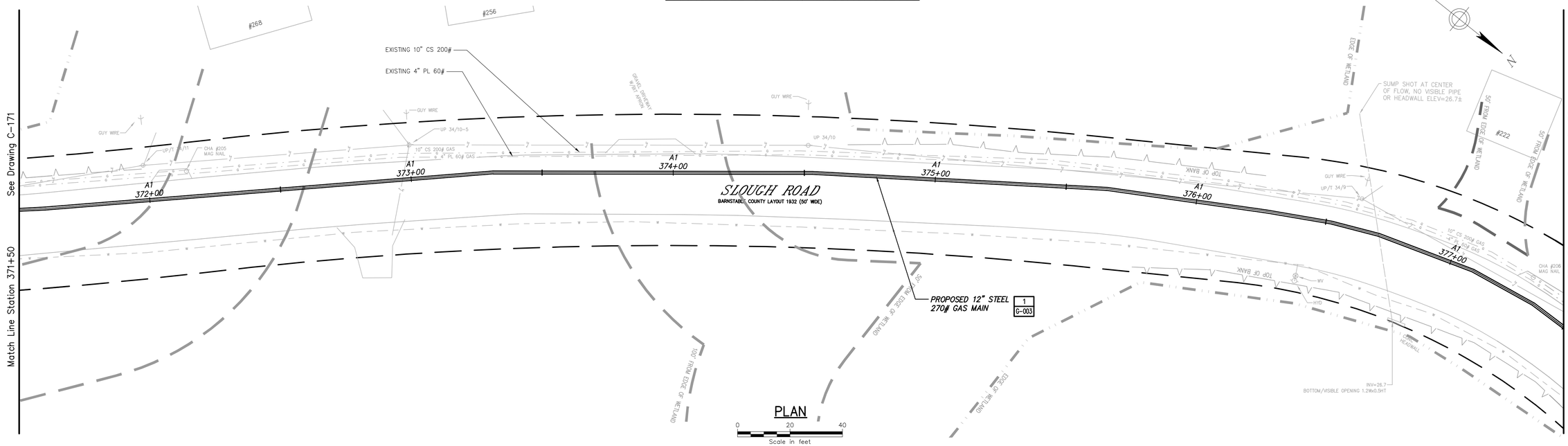
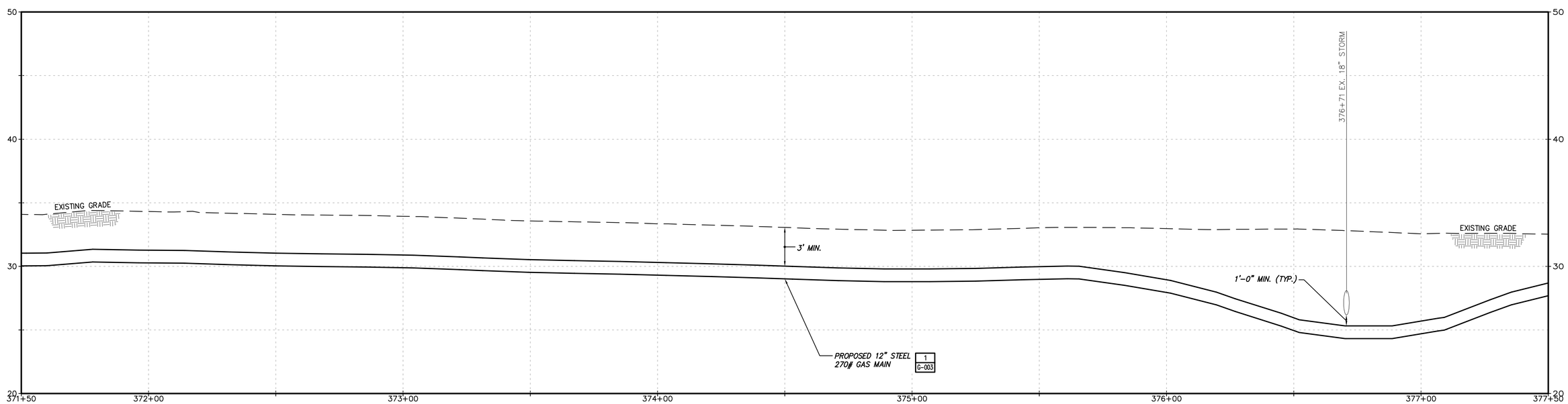
DRAWING NUMBER C-172

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-172-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-172-29847		C-172

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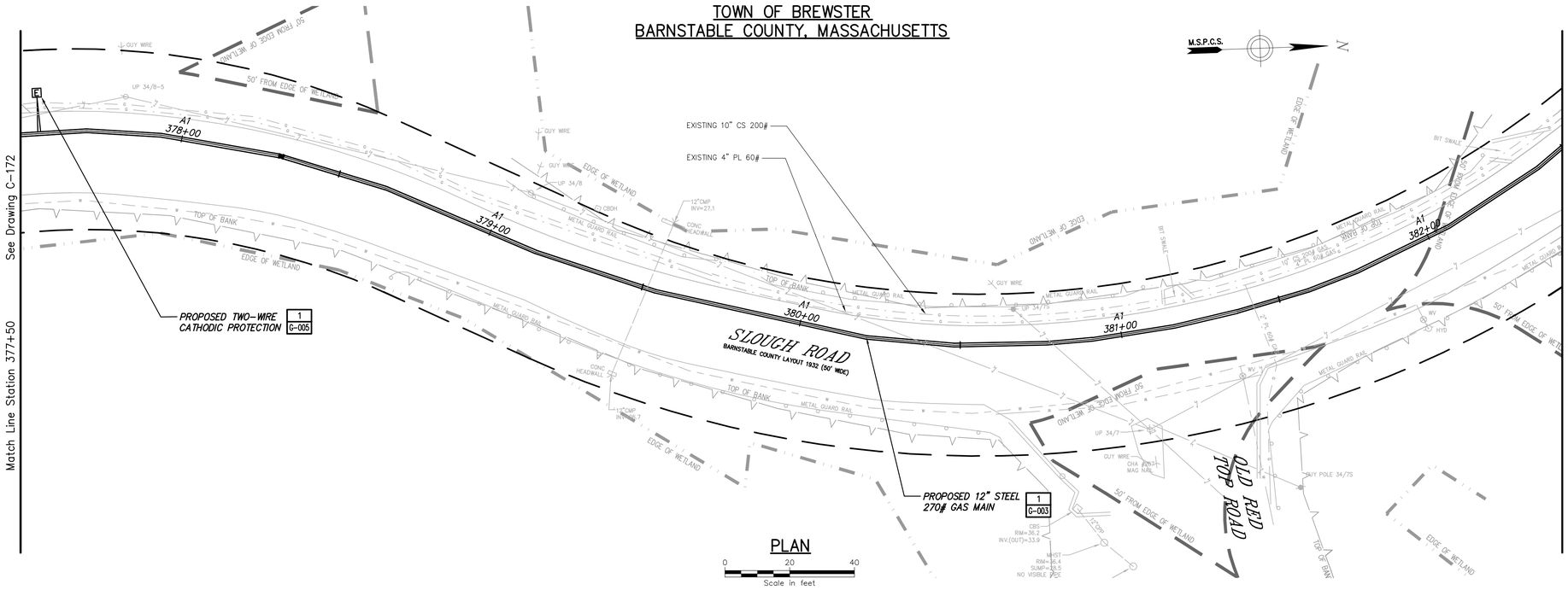
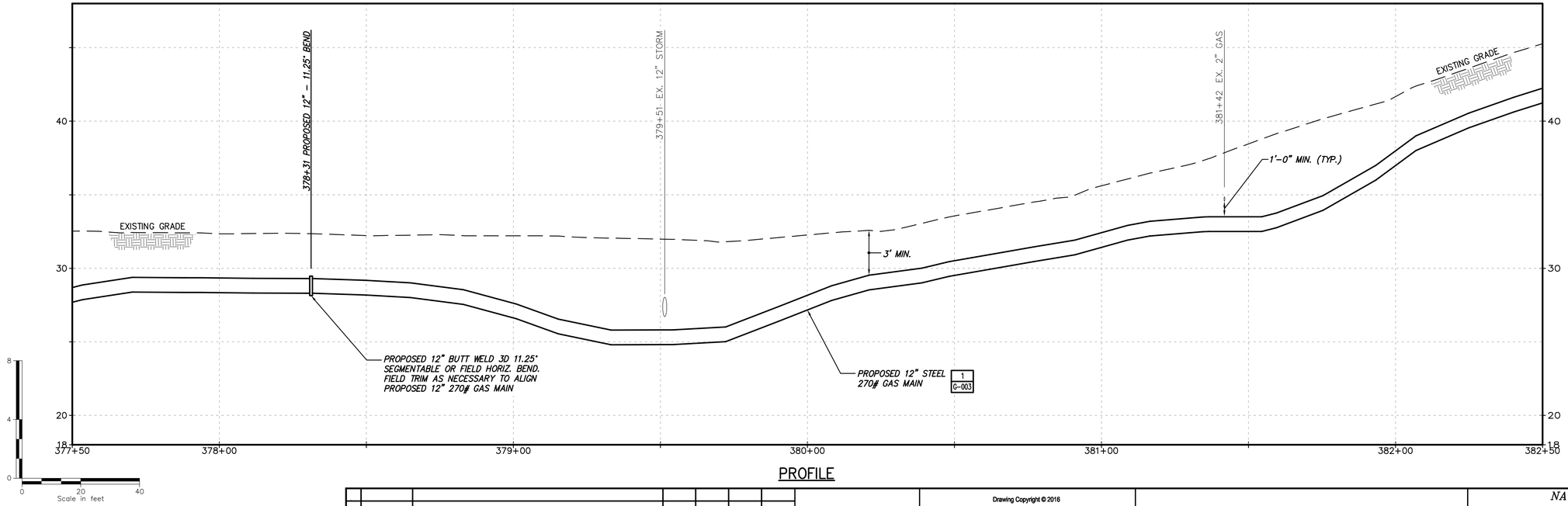
DRAWING NUMBER
C-173

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-173-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-173-29847		C-173

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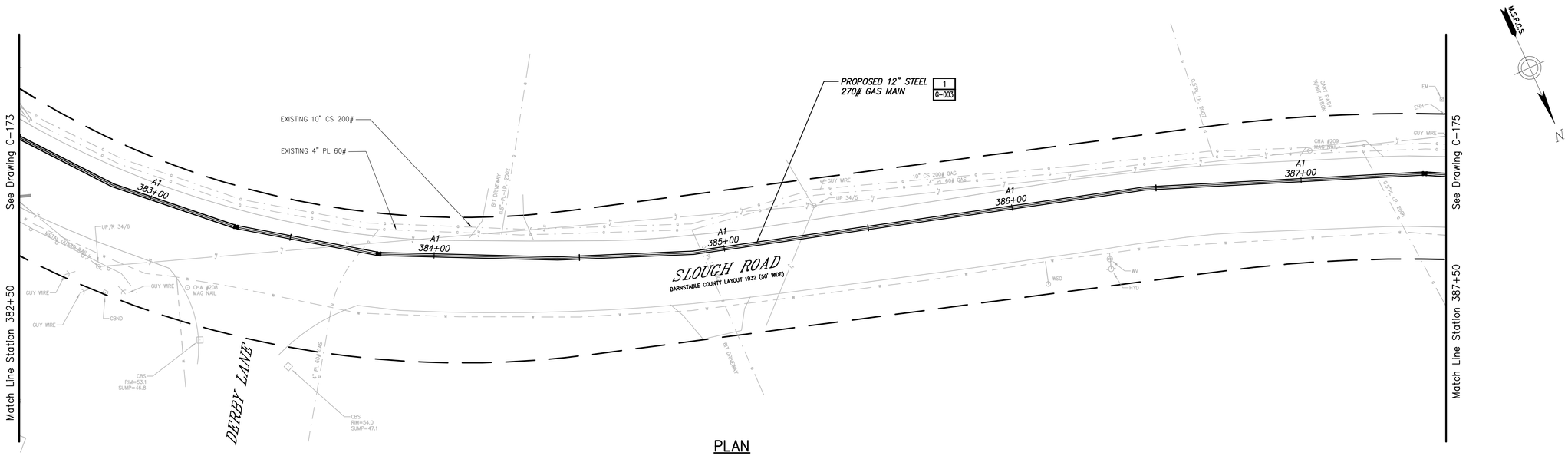
DRAWING NUMBER
C-174

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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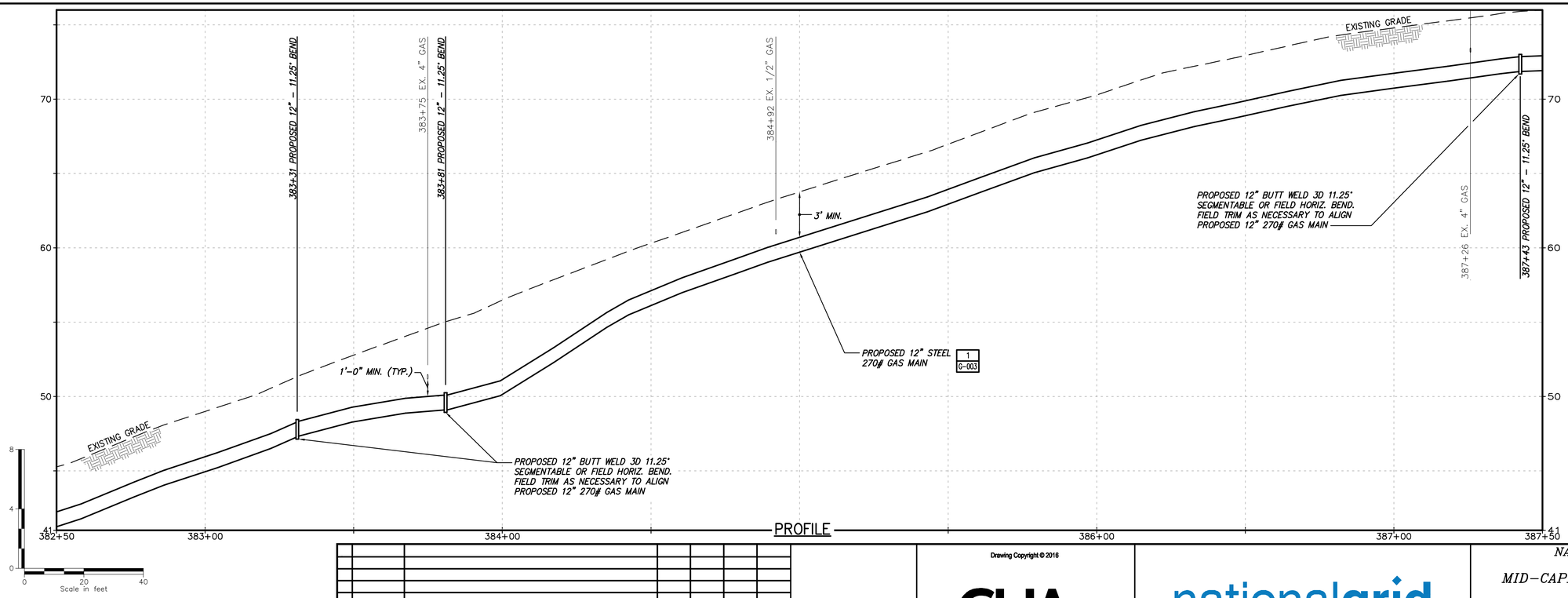
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-174-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-174-29847		C-174

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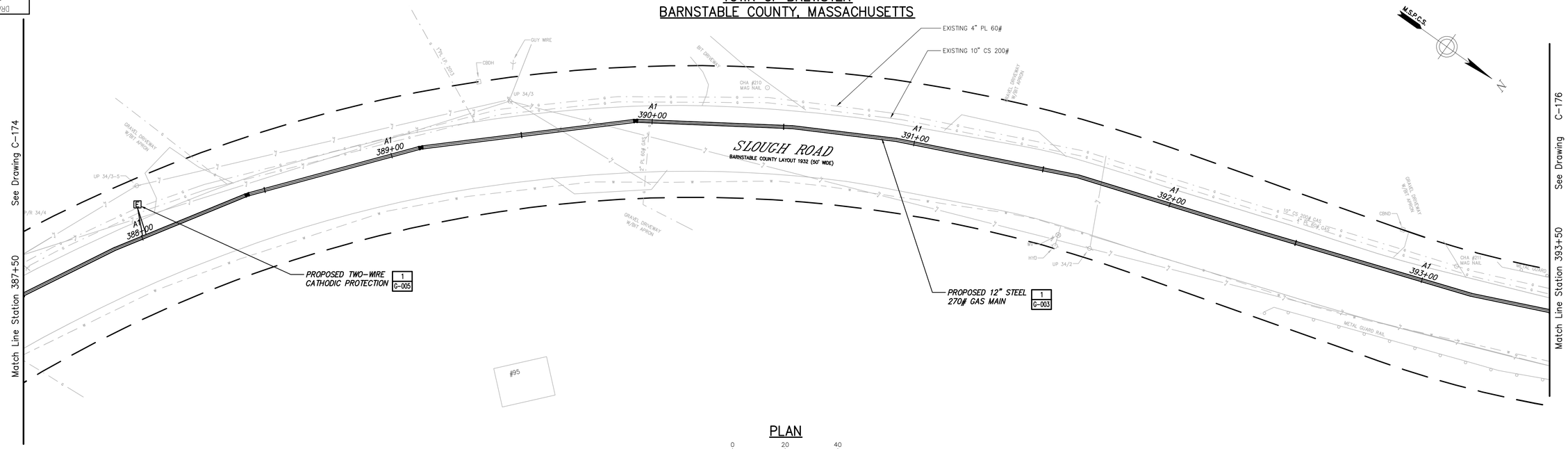
DRAWING NUMBER C-175

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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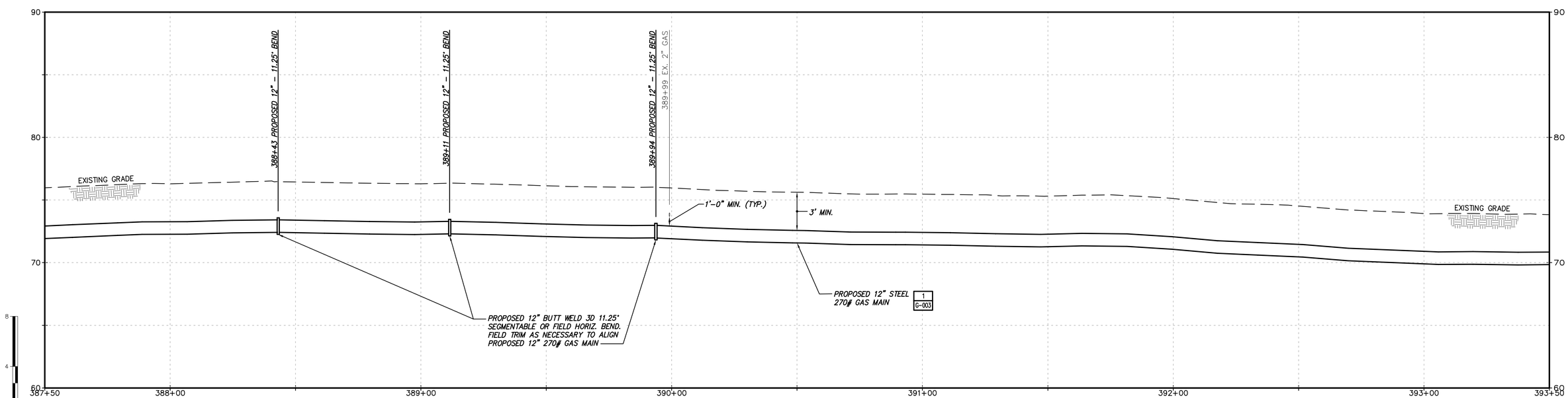
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-175-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-175-29847		C-175

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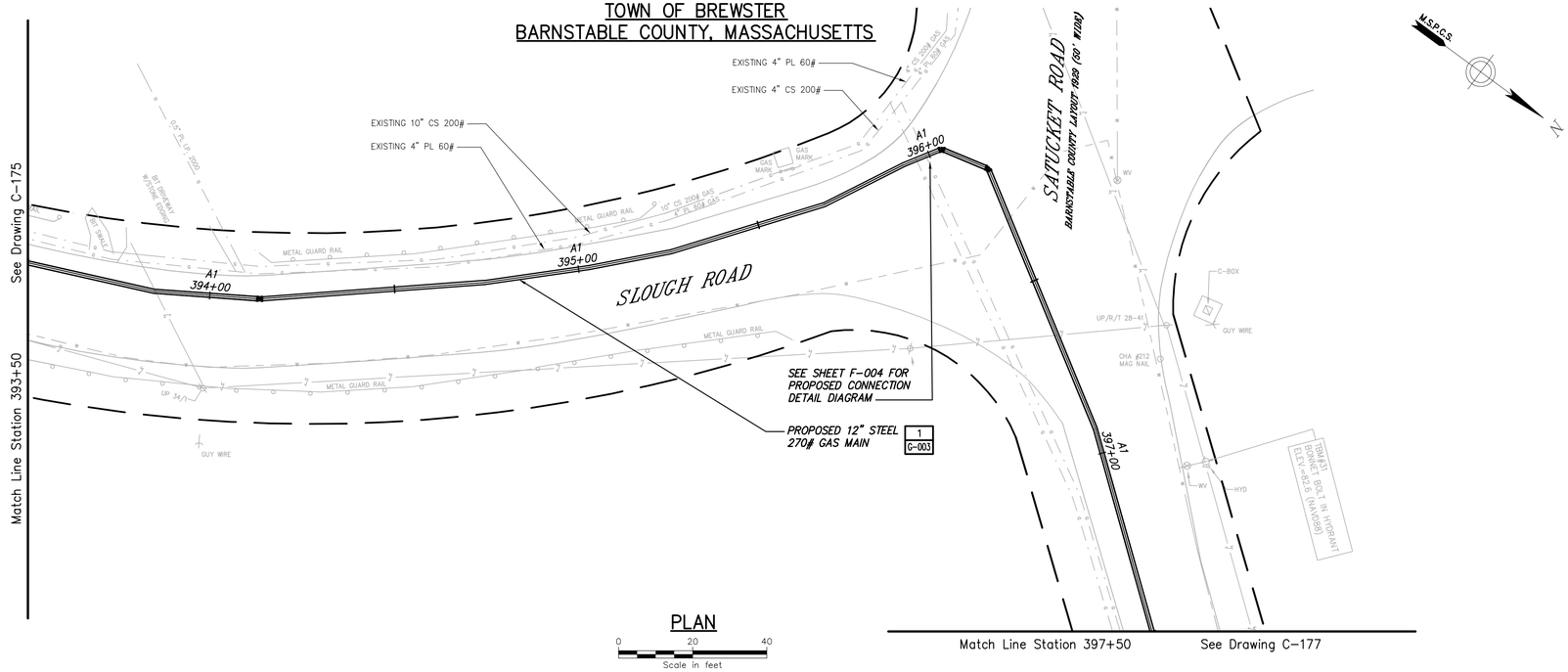
DRAWING NUMBER
C-176

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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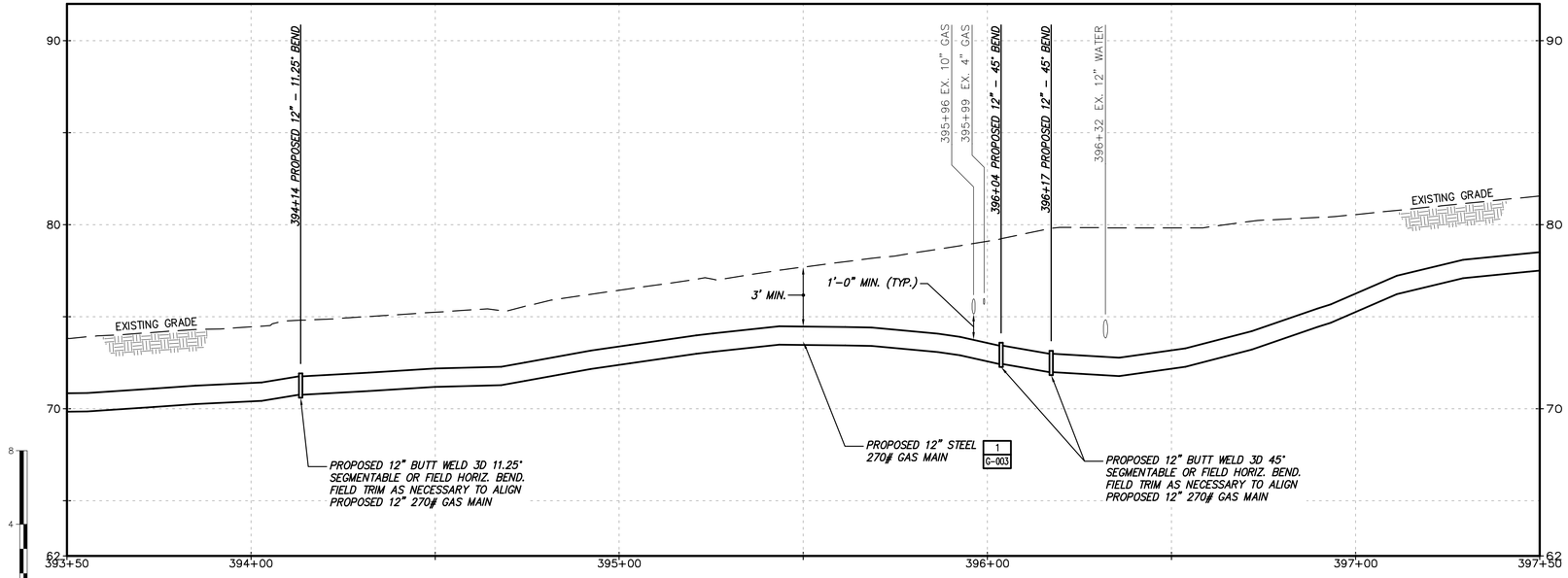
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-176-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-176-29847	SEQUENCE No.	DRAWING NUMBER C-176
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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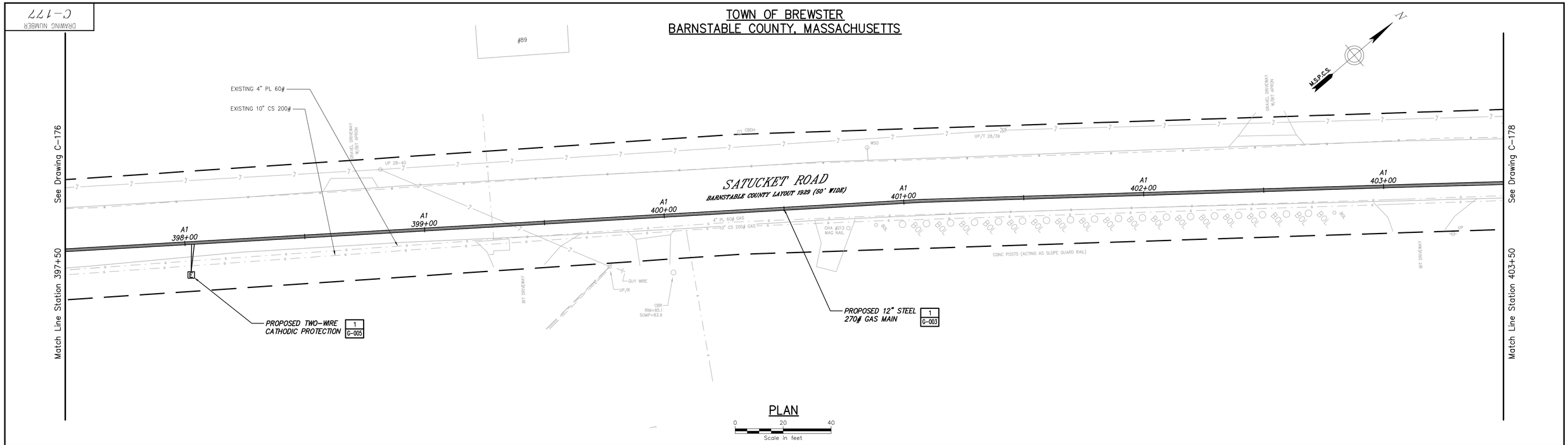
DRAWING NUMBER C-177

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



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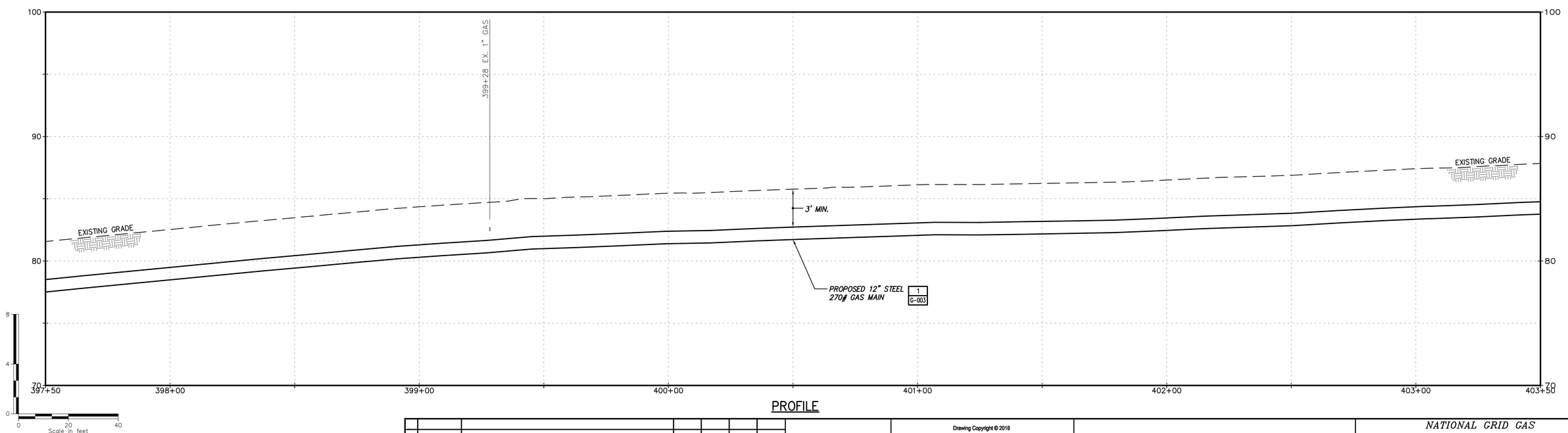

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-177-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-177-29847		C-177

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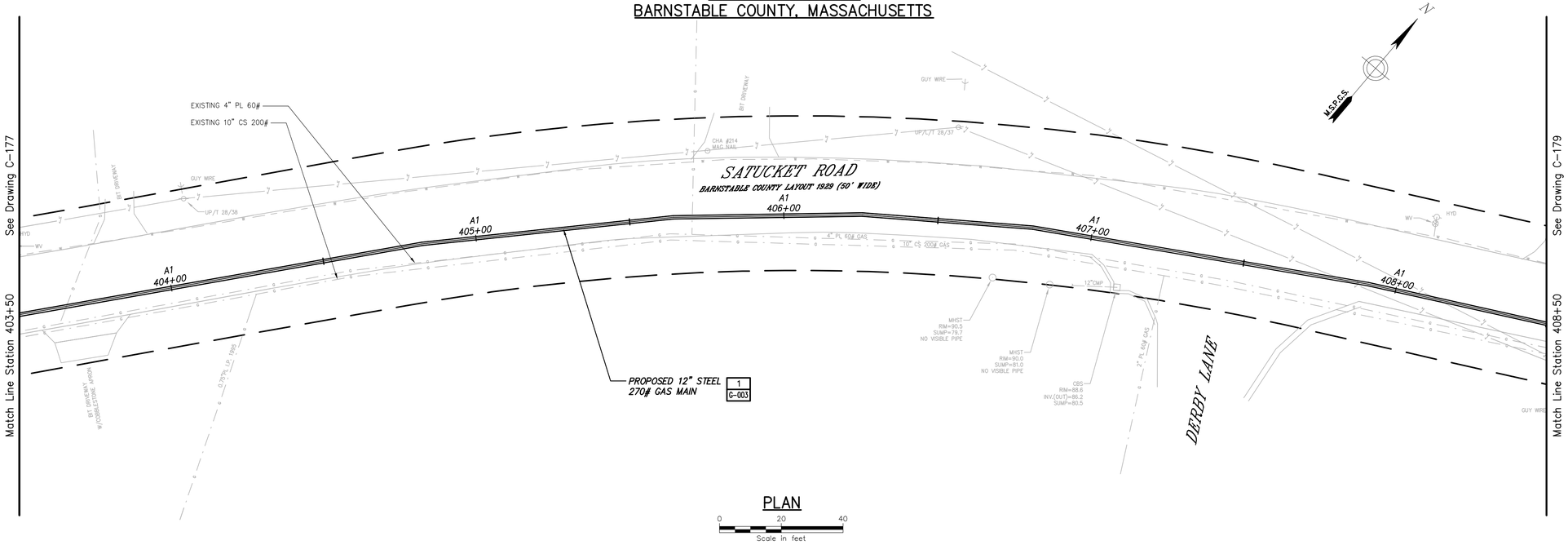
DRAWING NUMBER
C-178

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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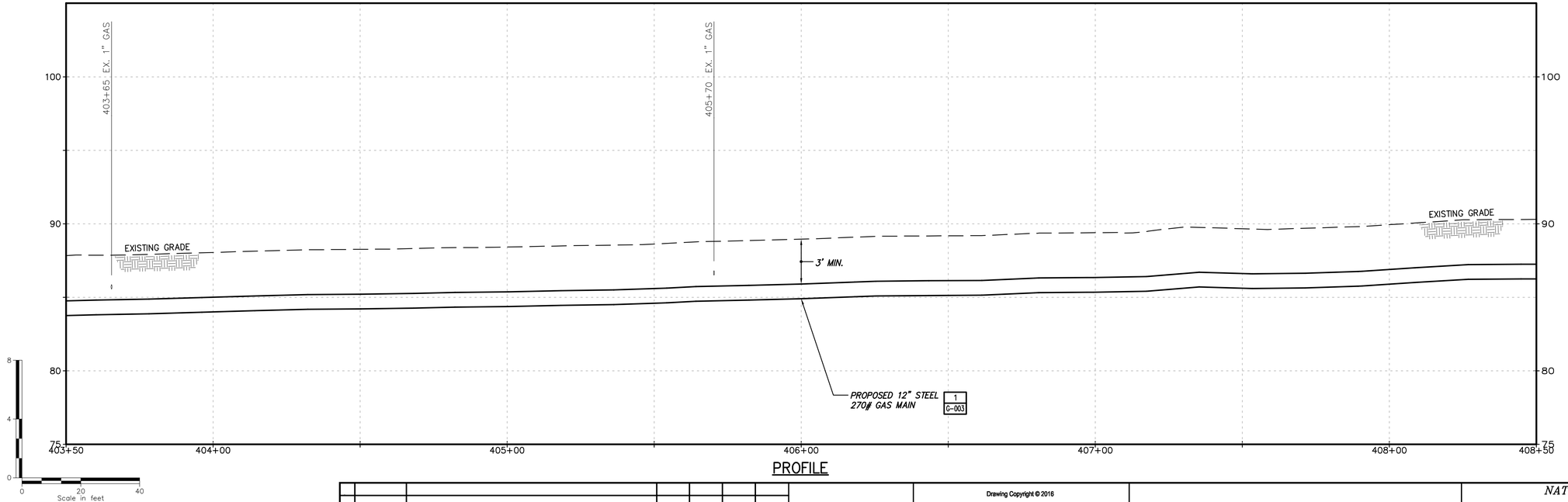
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-178-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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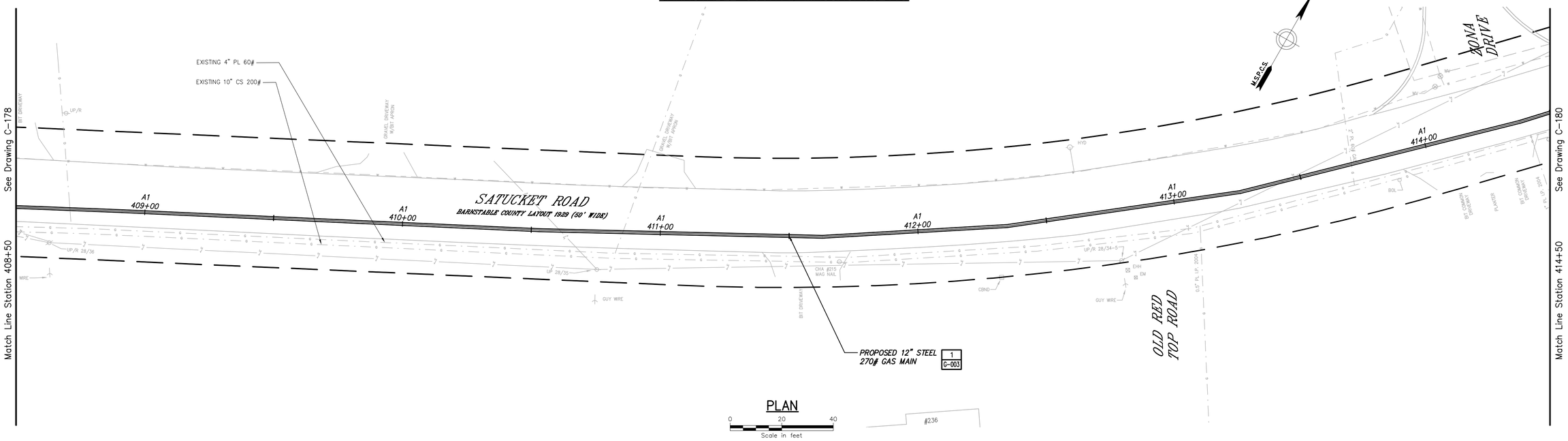
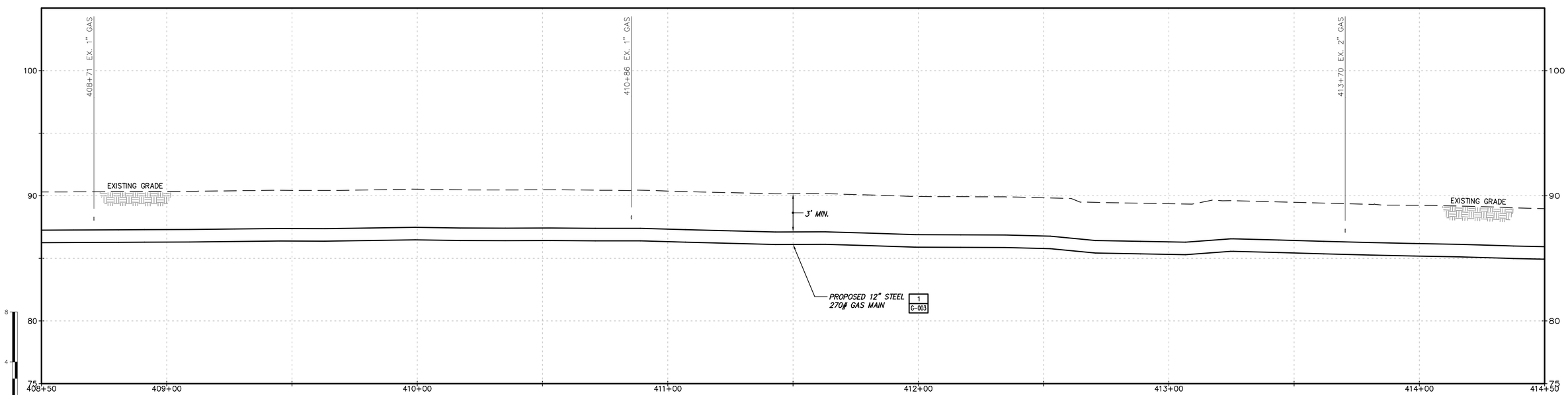
DRAWING NUMBER C-179

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-179-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-179-29847		C-179

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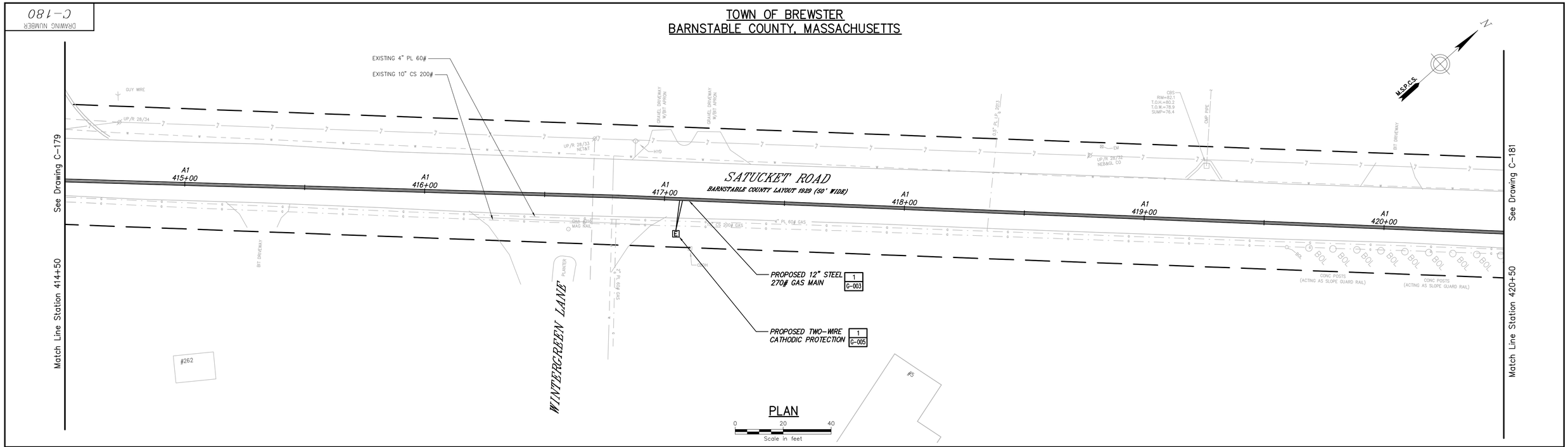
Saved: 1/14/2016 3:02:16 PM Plotted: 1/22/2016 1:34:18 PM

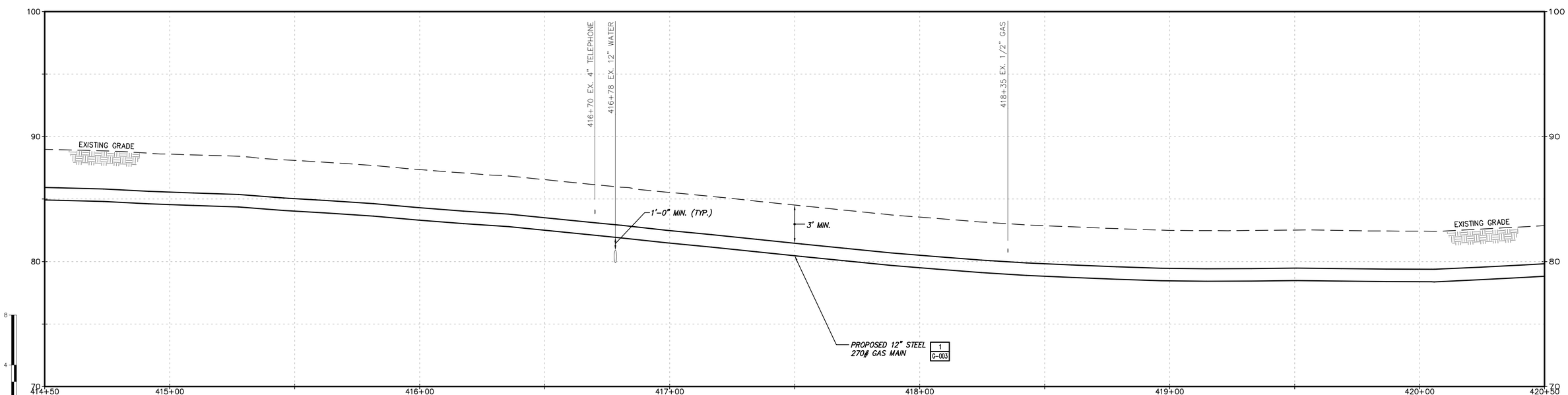
DRAWING NUMBER C-180

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



PROFILE

Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-180-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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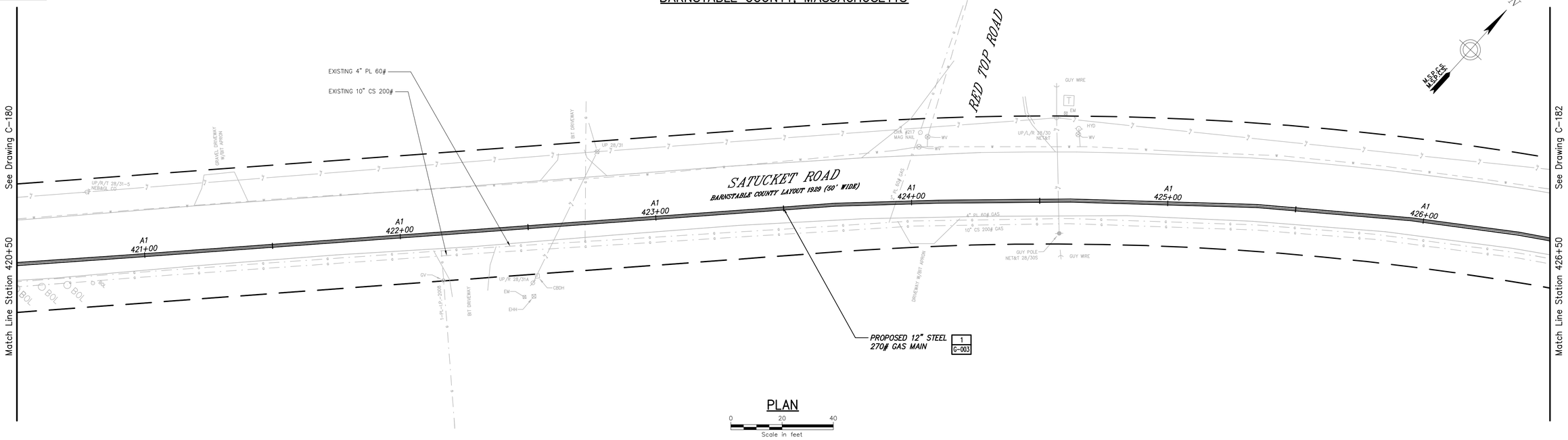
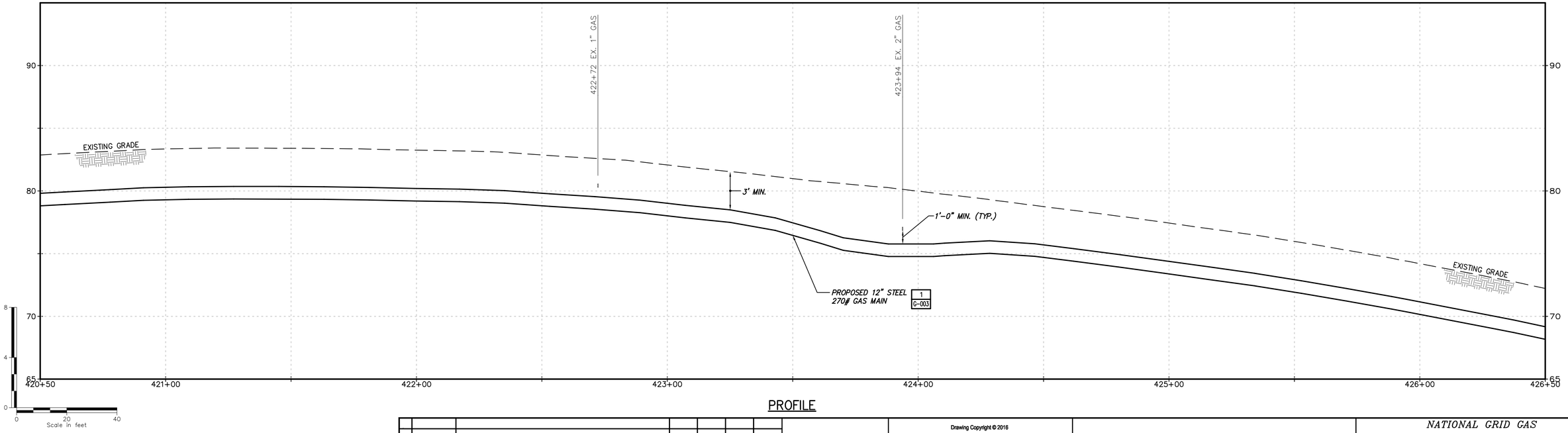
DRAWING NUMBER C-181

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-181-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-181-29847		C-181

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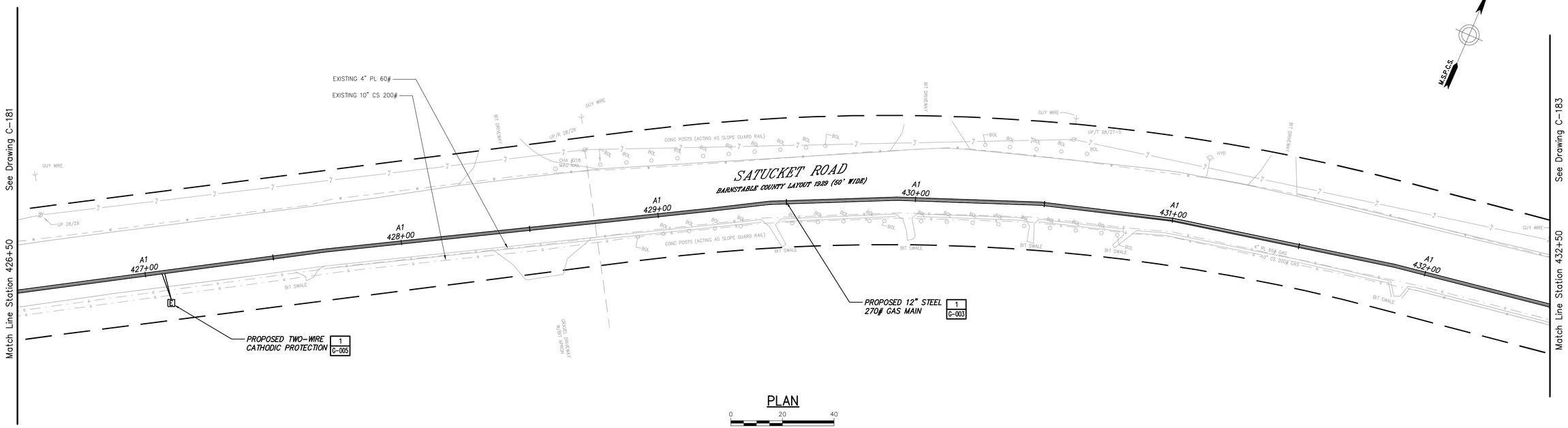
DRAWING NUMBER C-182

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



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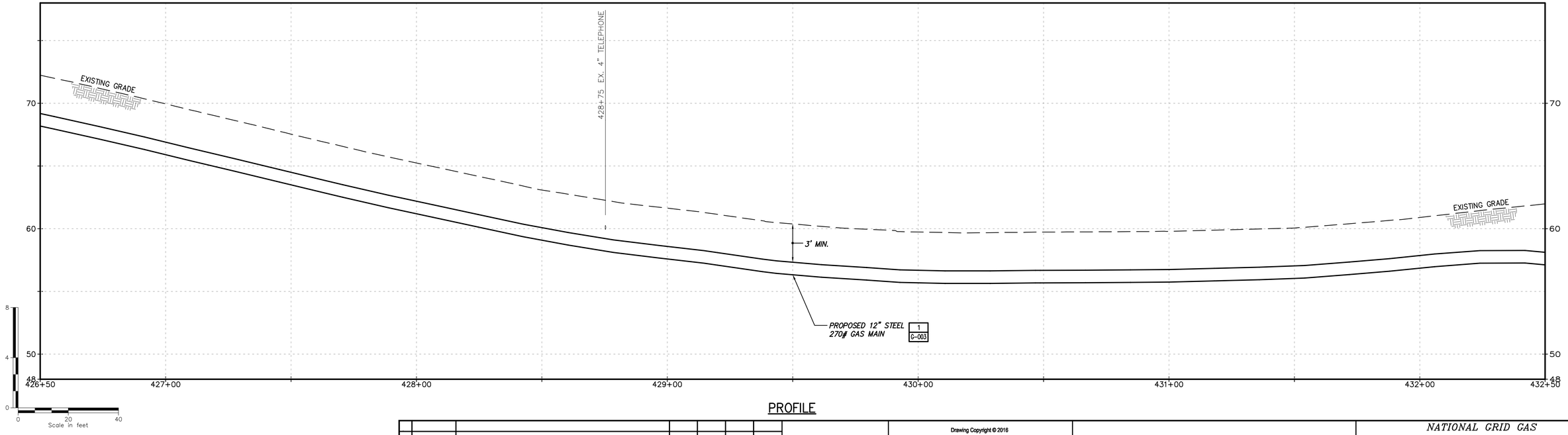

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No.	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-182-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-182-29847		C-182

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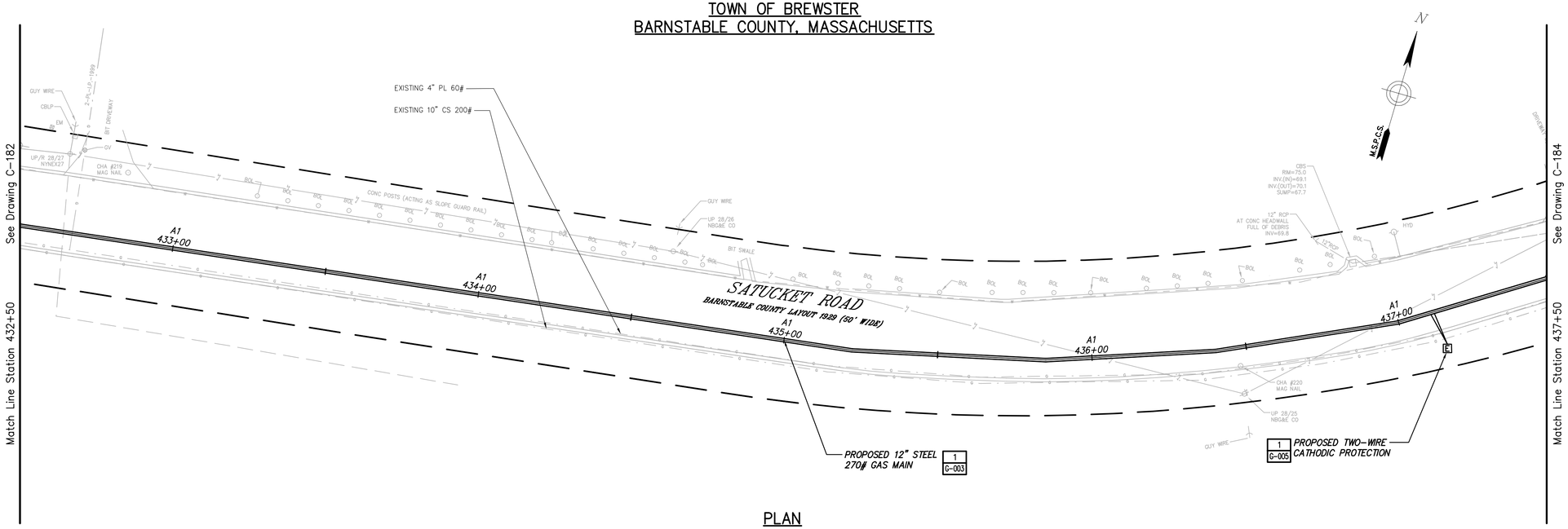
DRAWING NUMBER C-183

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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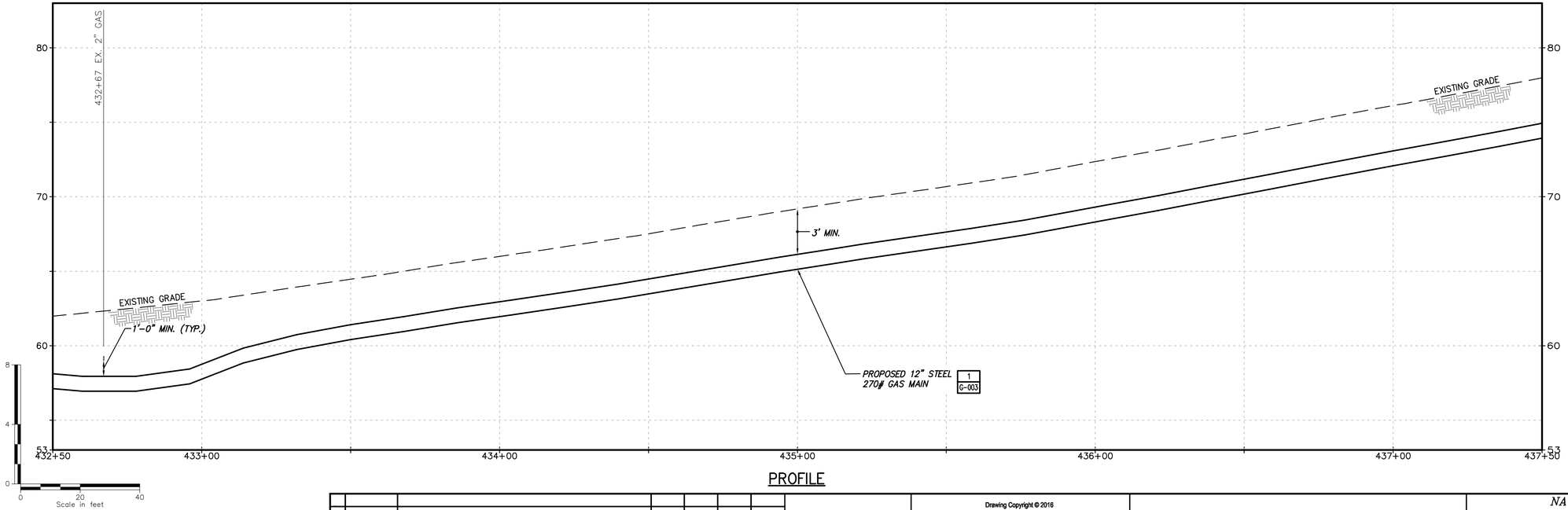
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-183-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-183-29847		C-183

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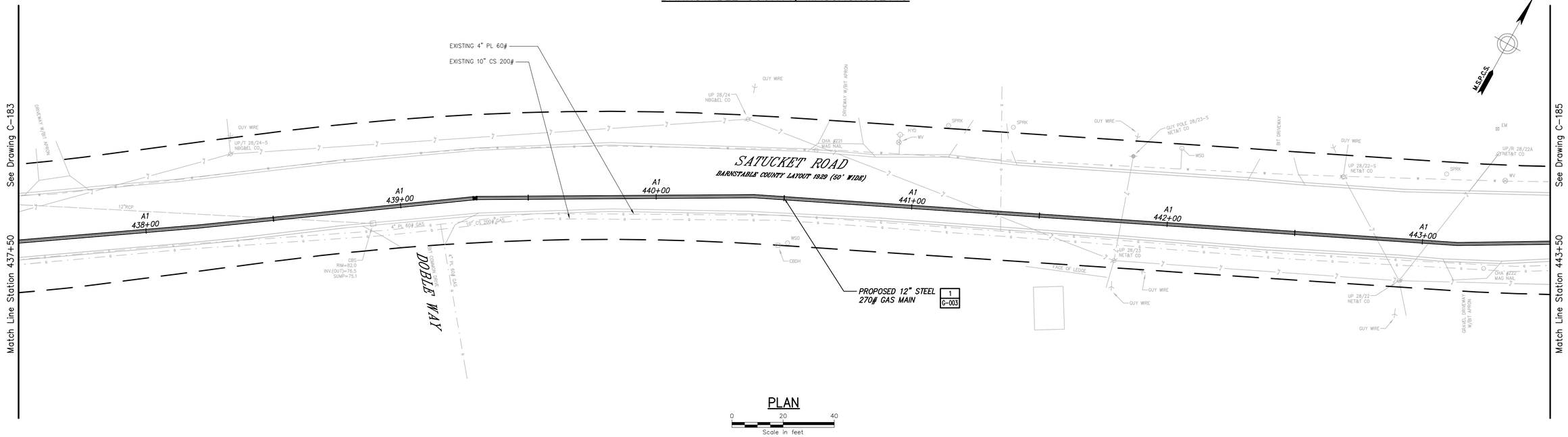
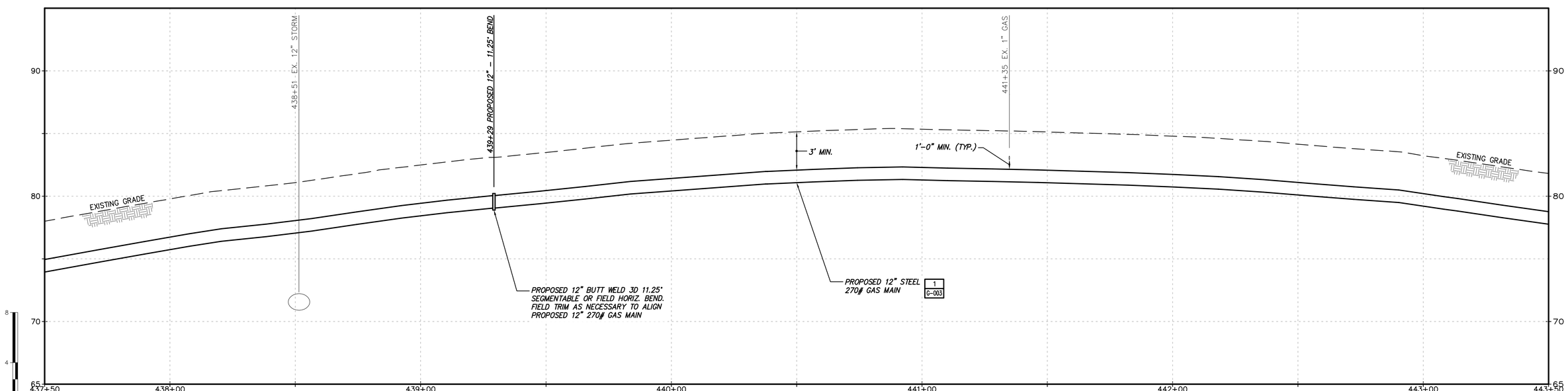
DRAWING NUMBER C-184

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-184-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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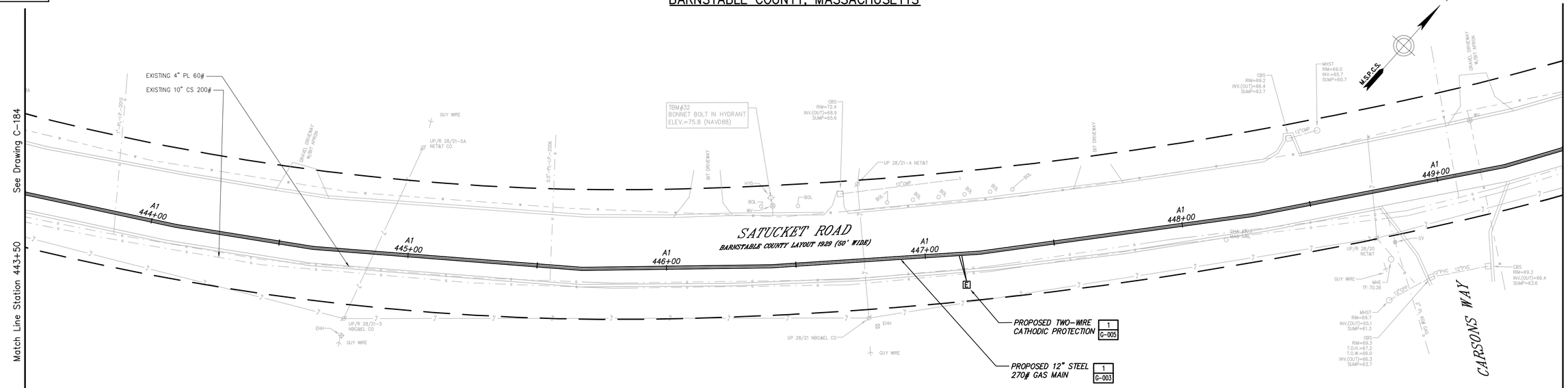
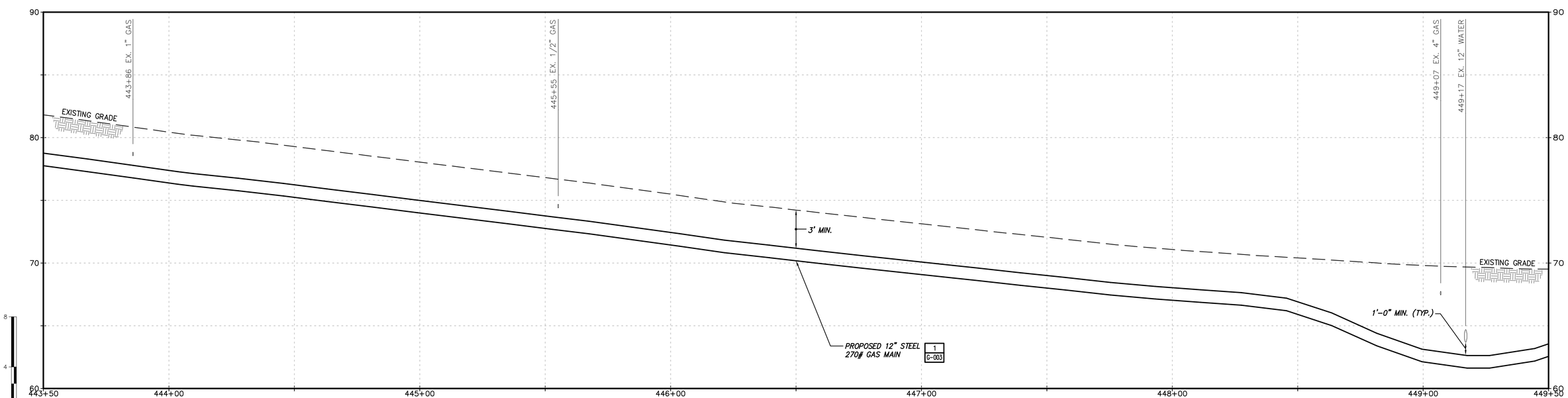
DRAWING NUMBER C-185

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-185-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-185-29847		C-185

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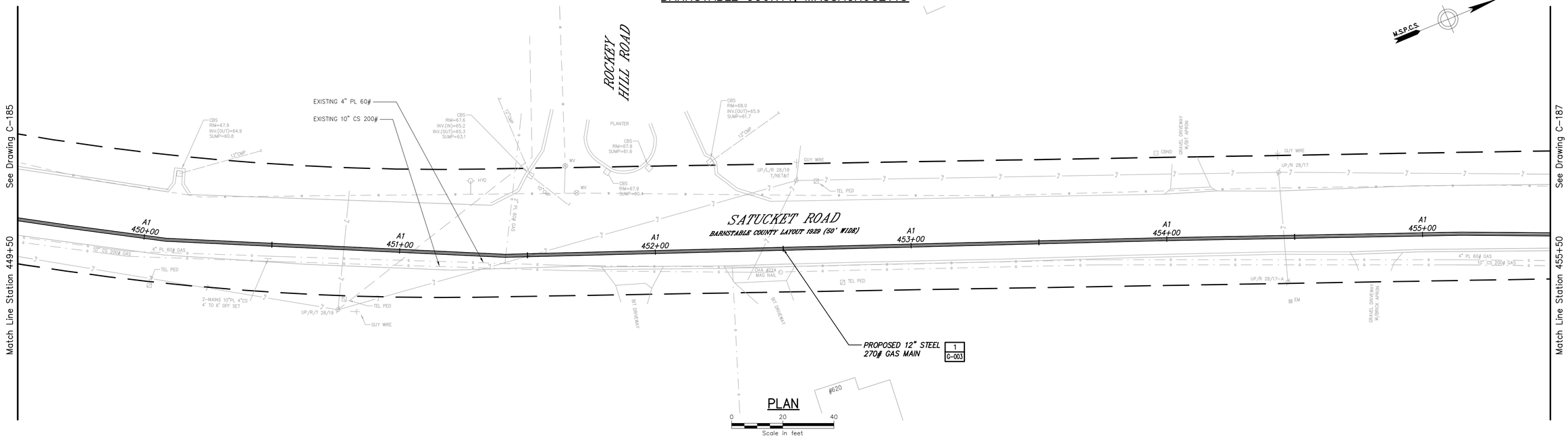
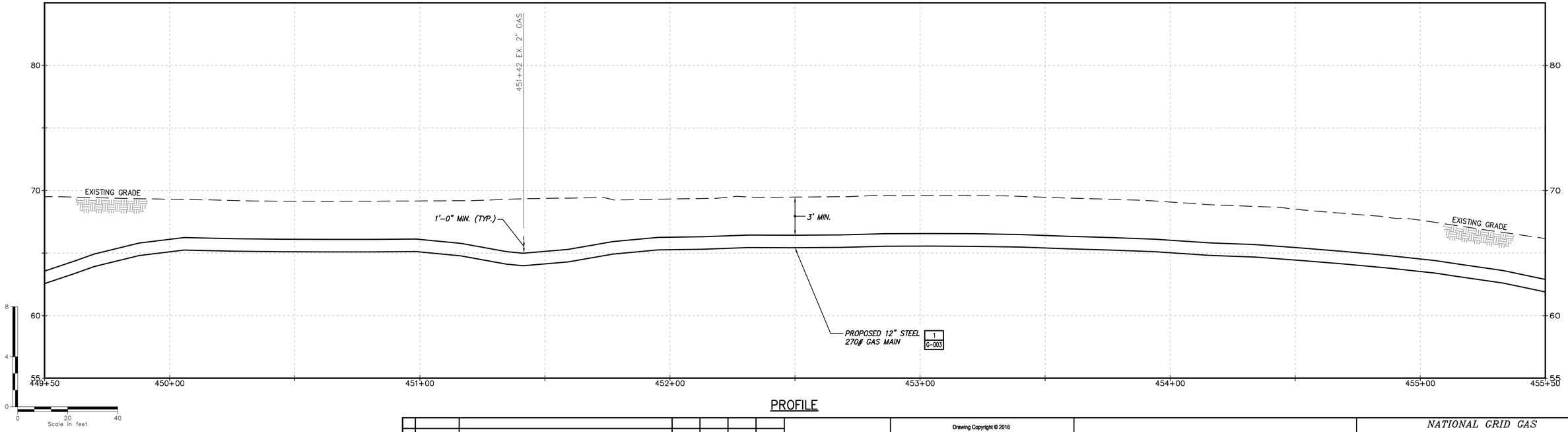
DRAWING NUMBER C-186

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-186-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-186-29847		C-186

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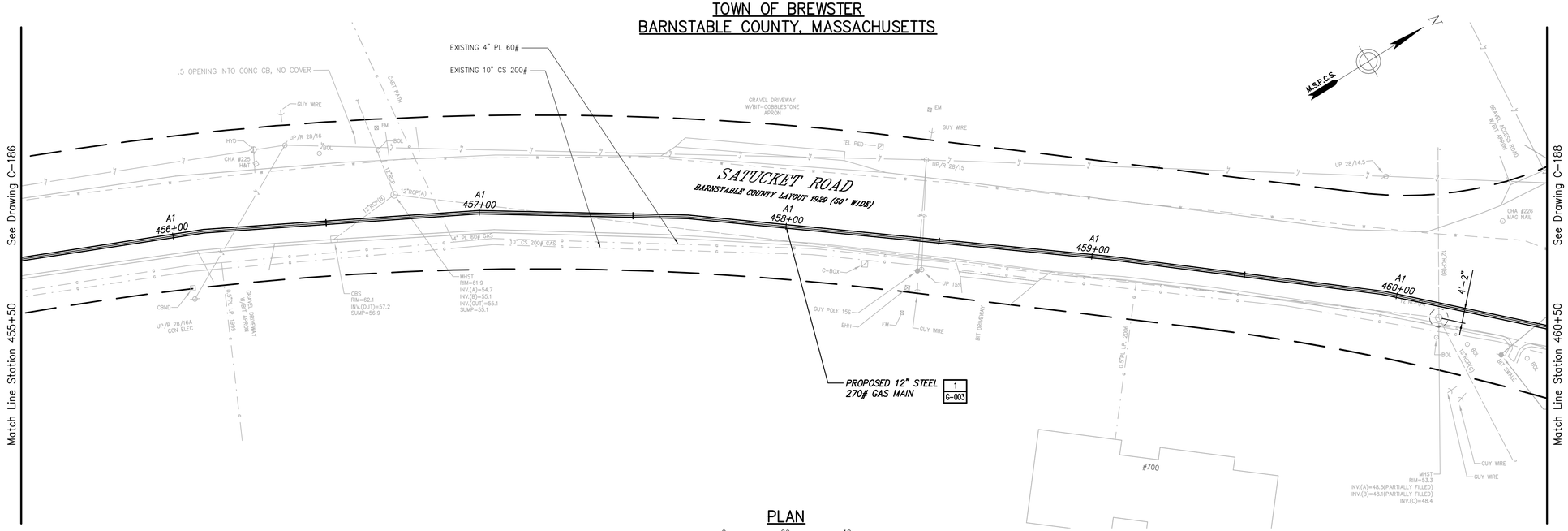
DRAWING NUMBER
C-187

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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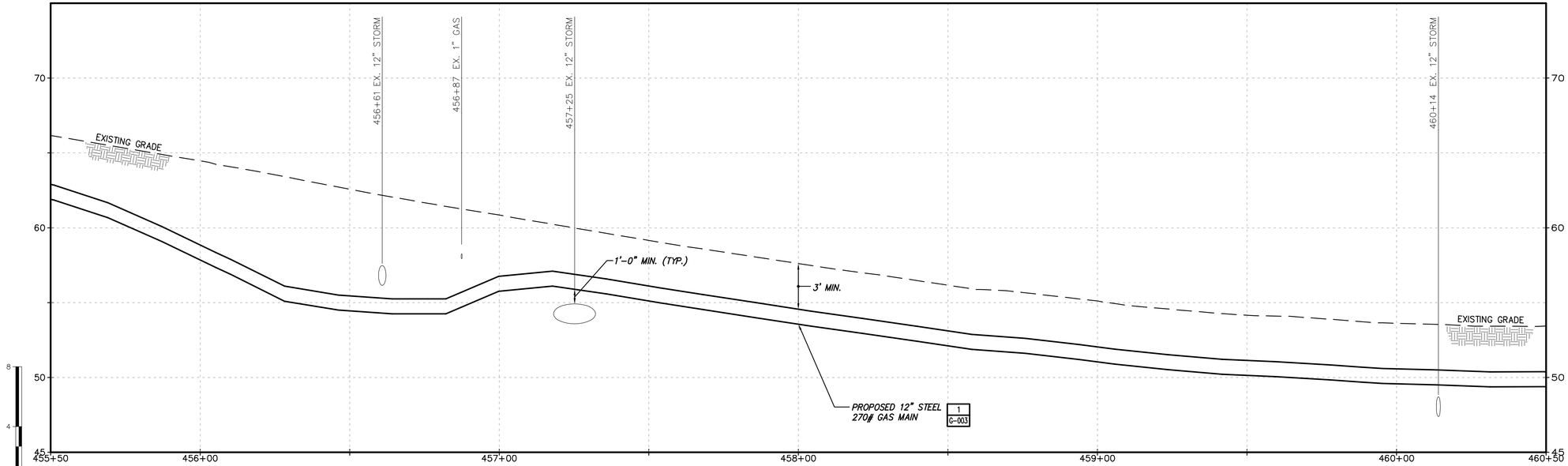
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-187-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-187-29847		C-187

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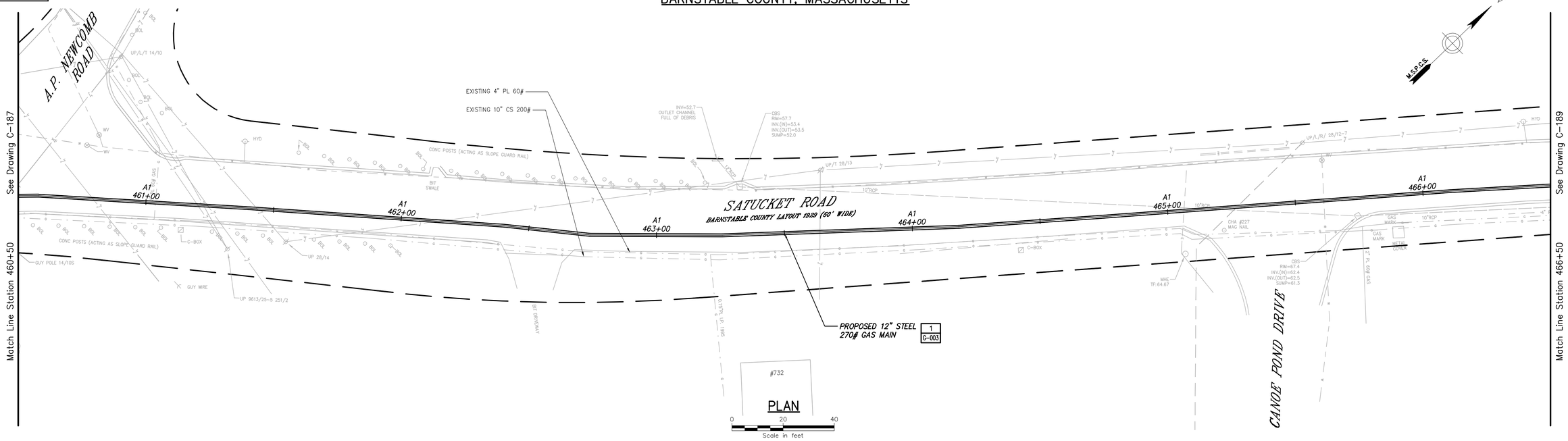
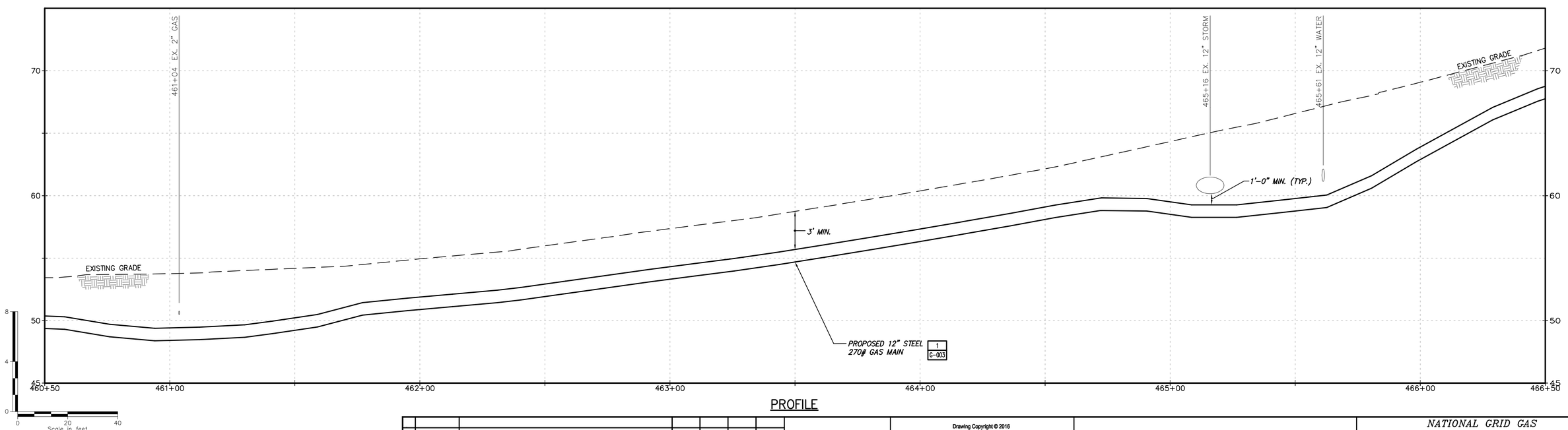
DRAWING NUMBER C-188

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS





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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-188-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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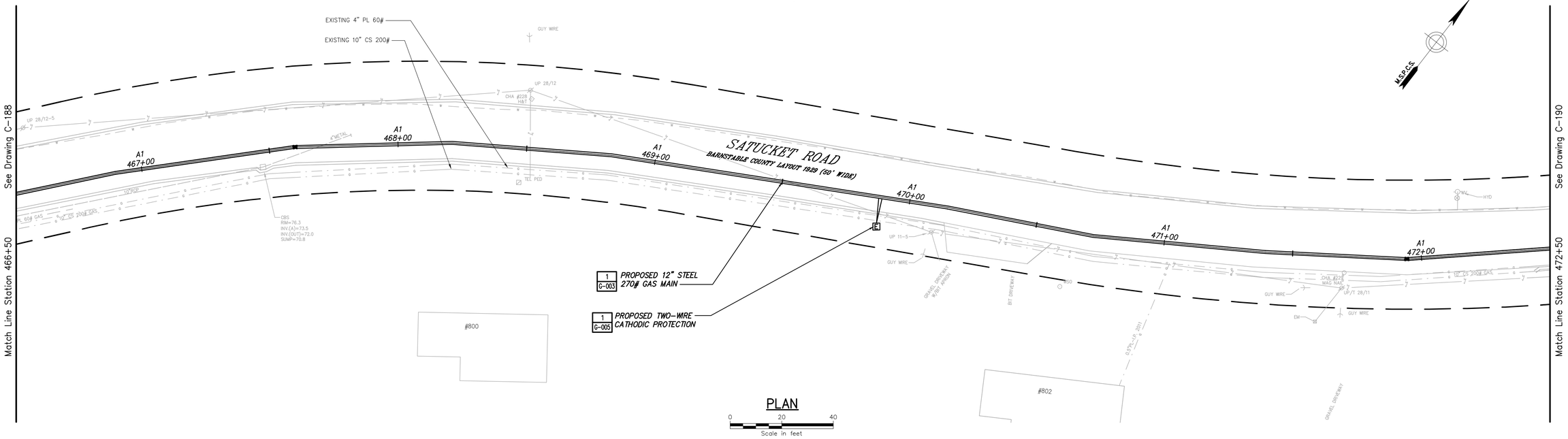
DRAWING NUMBER
C-189

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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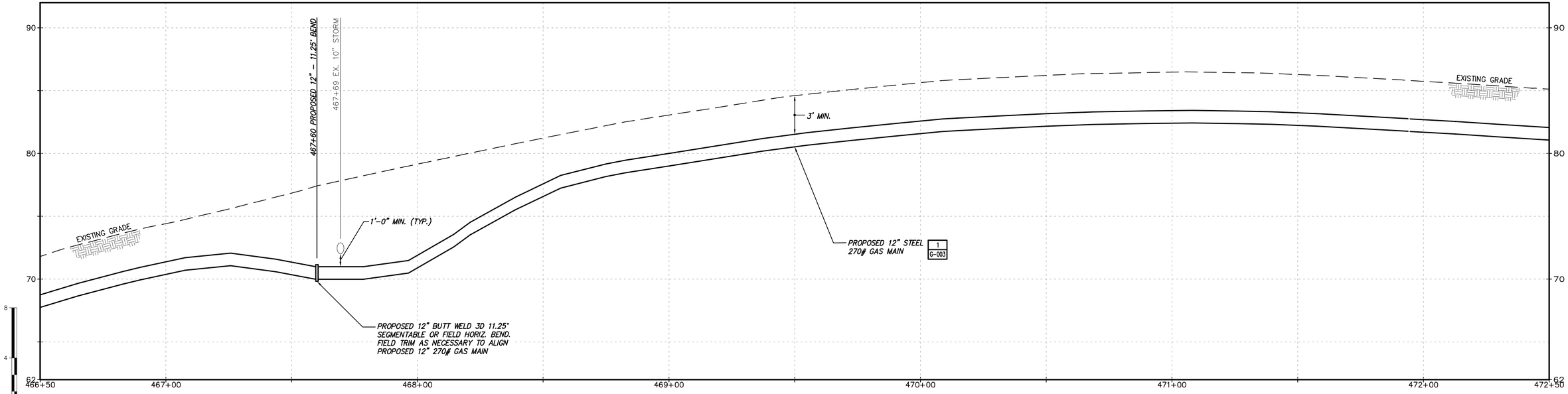
Scale in feet



PROFILE

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Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-189-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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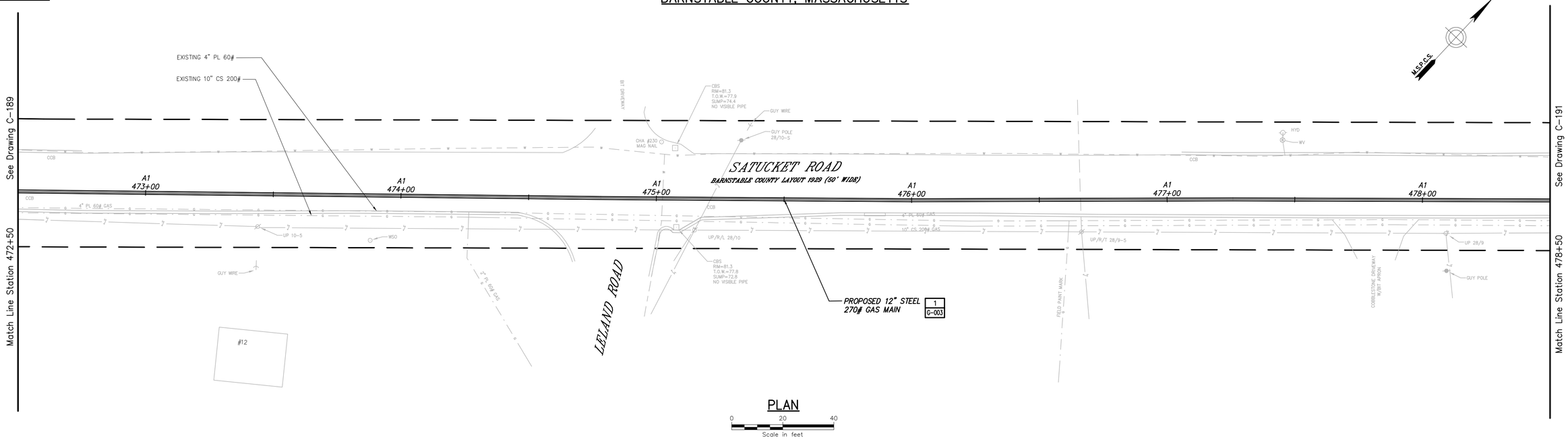
DRAWING NUMBER C-190

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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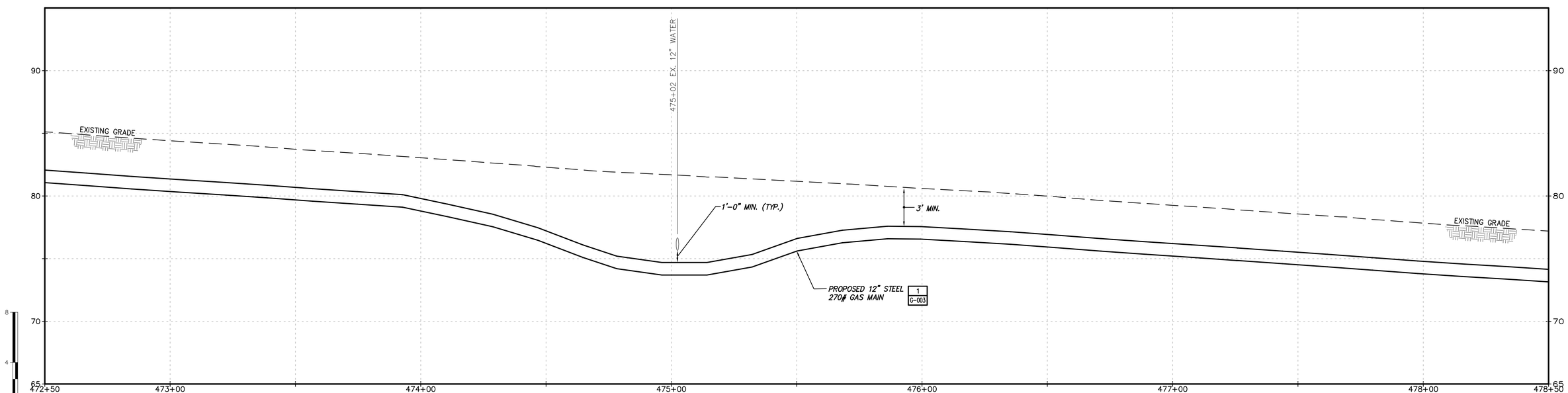

PROFILE

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Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-190-29847

CAD FILE NAME: C-190-29847
SEQUENCE No.
DRAWING NUMBER: C-190

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DRAWING NUMBER
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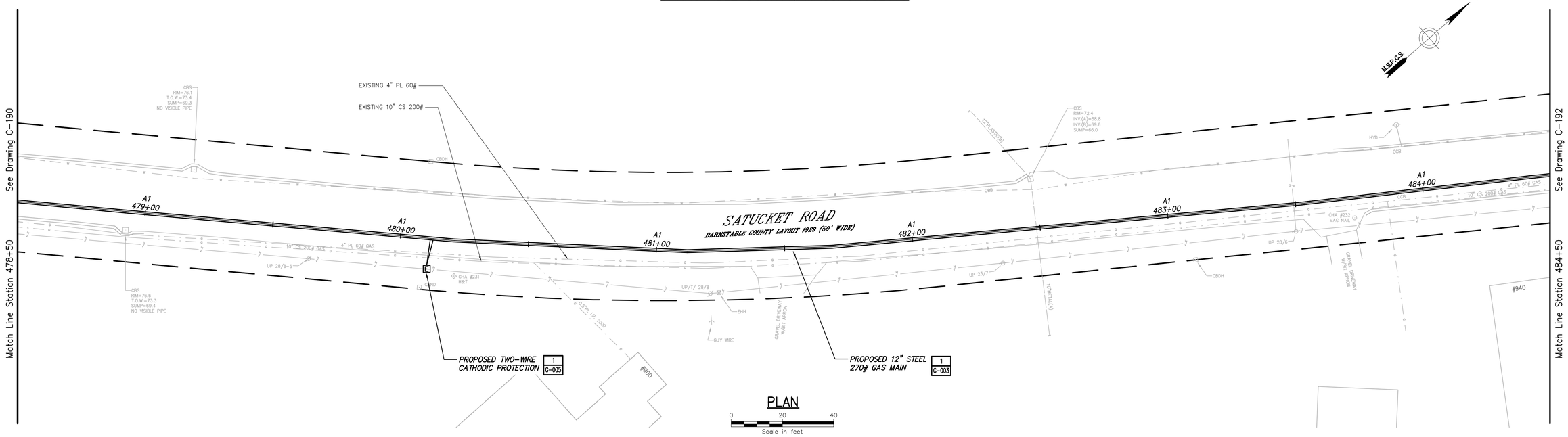
TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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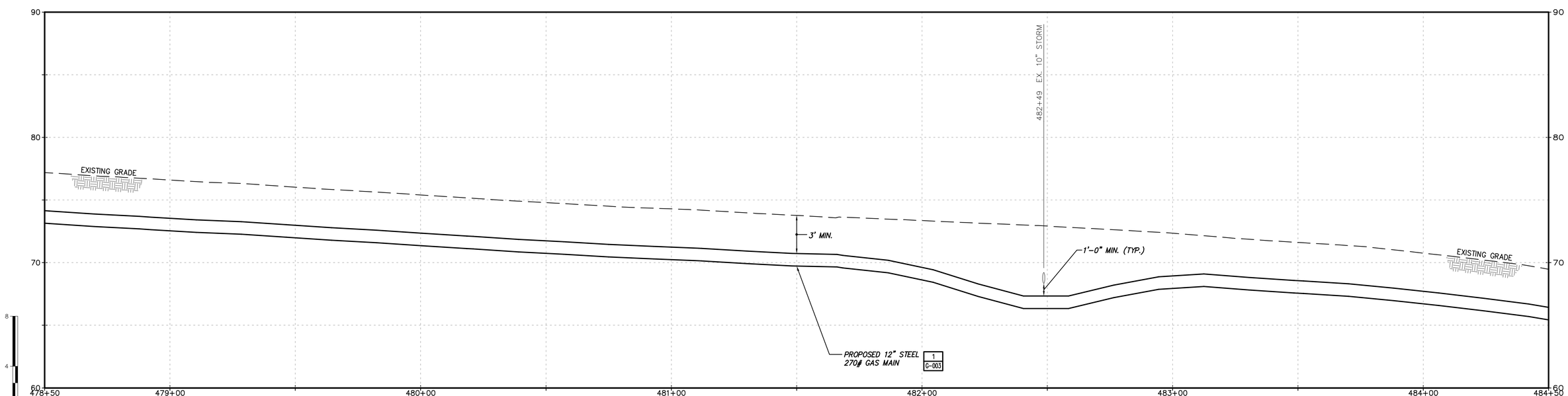
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-191-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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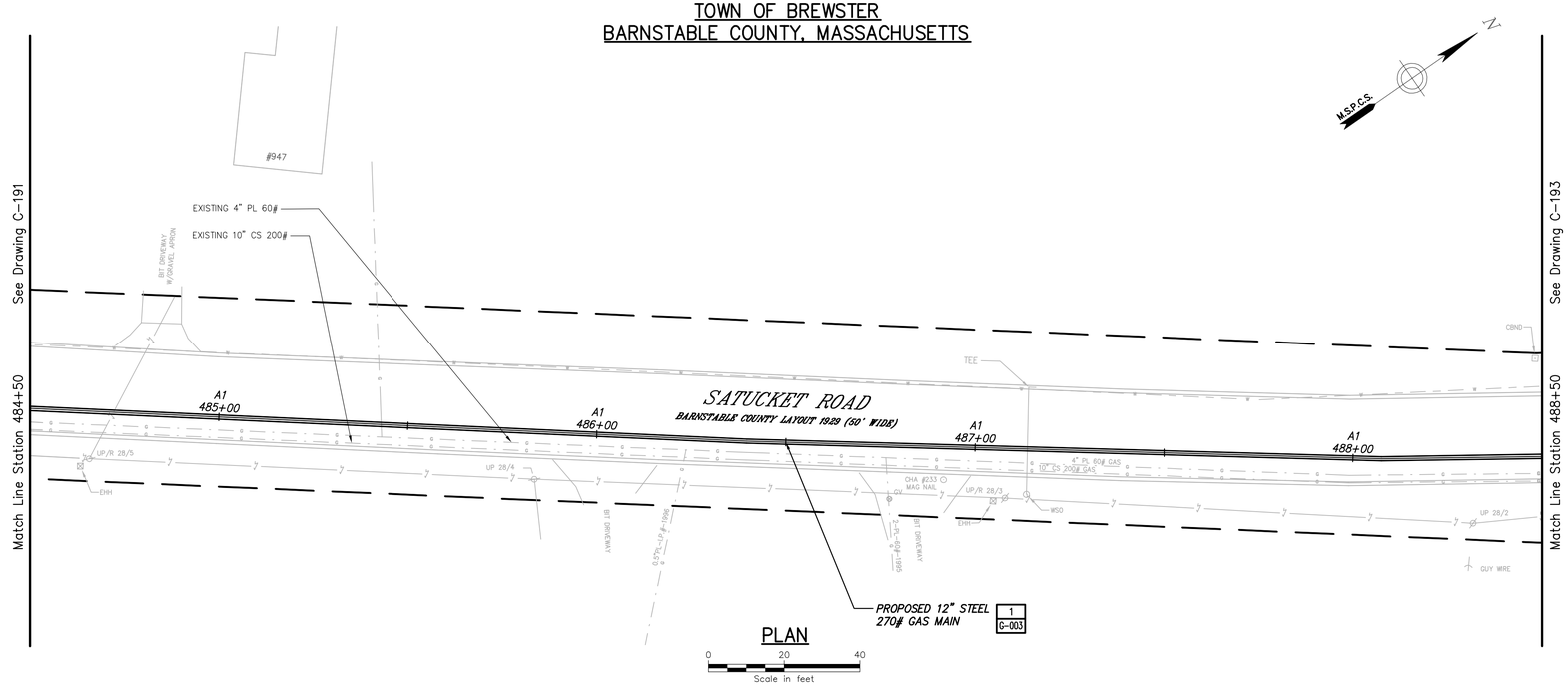
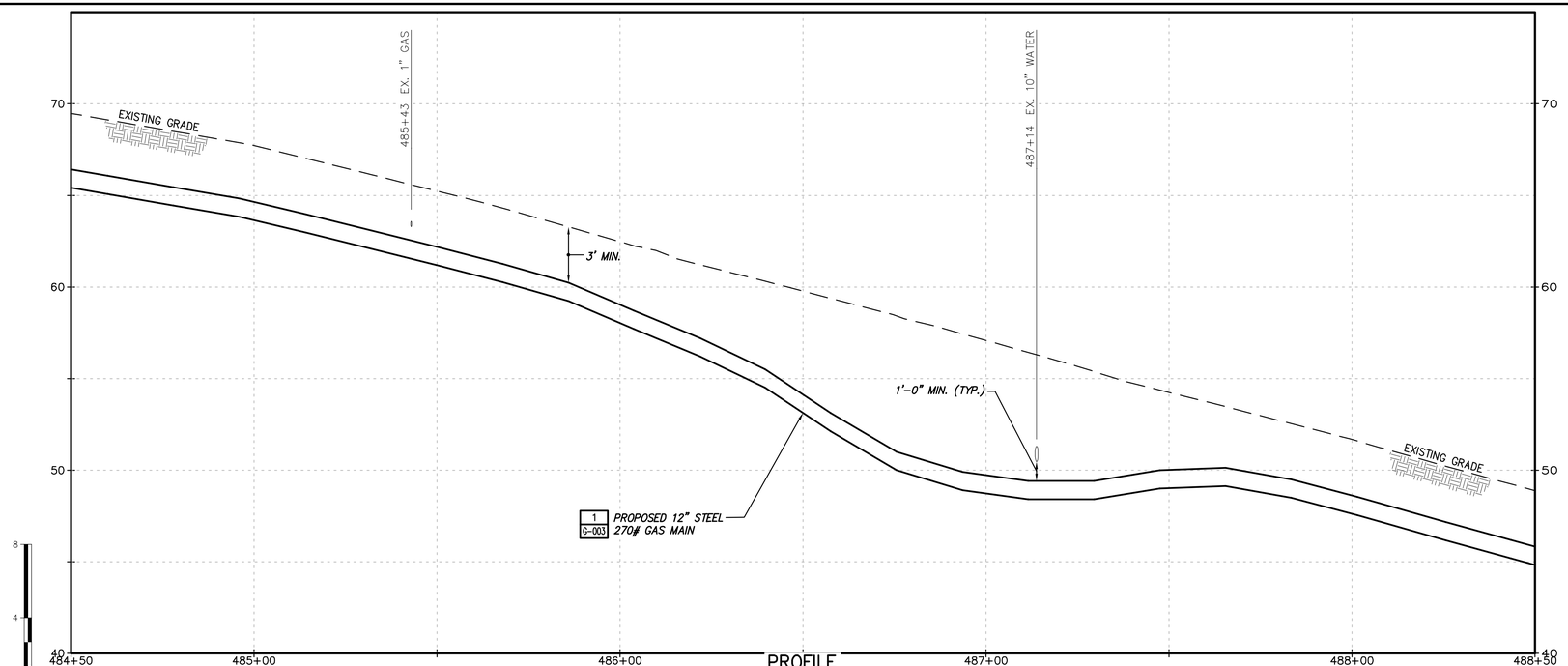
DRAWING NUMBER
C-192

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

8 4 0
0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Drawn RJT	Date 01/22/2016	Scale AS NOTED
Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-192-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-192-29847		C-192

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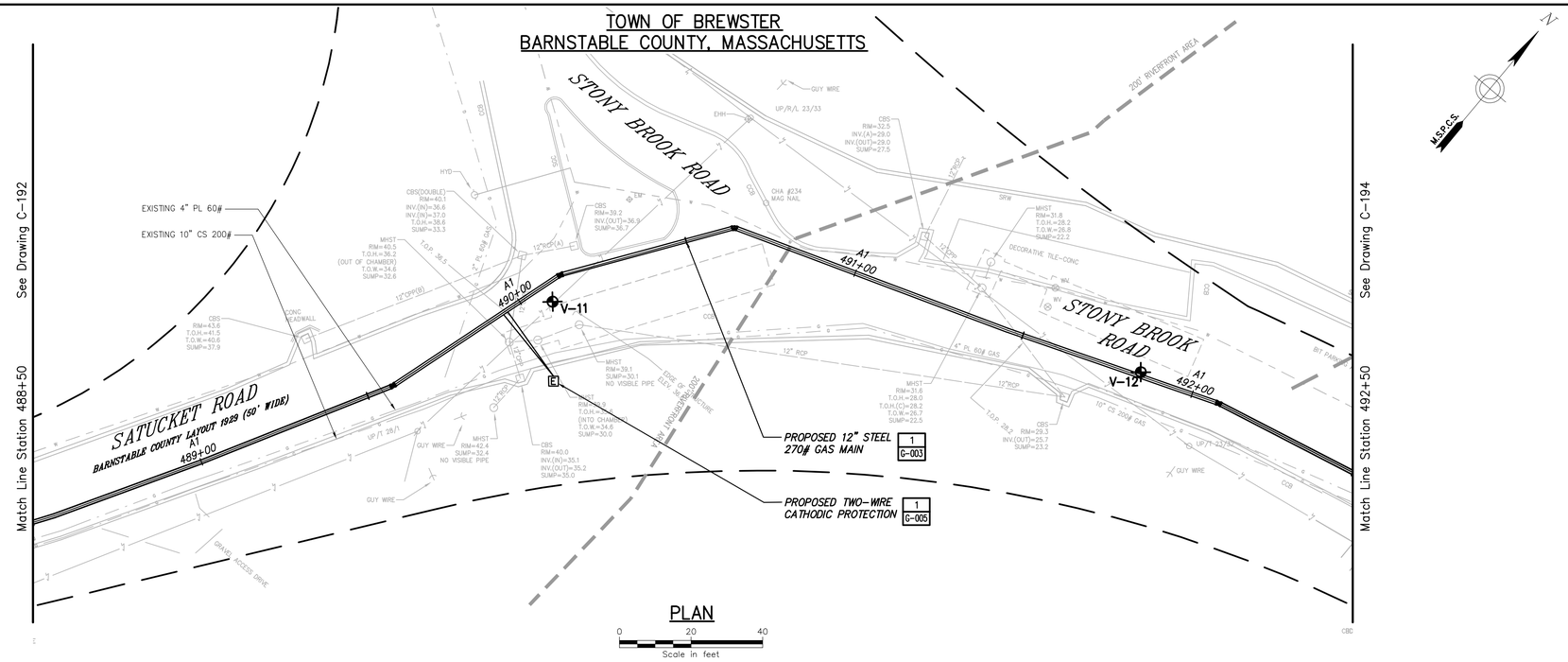
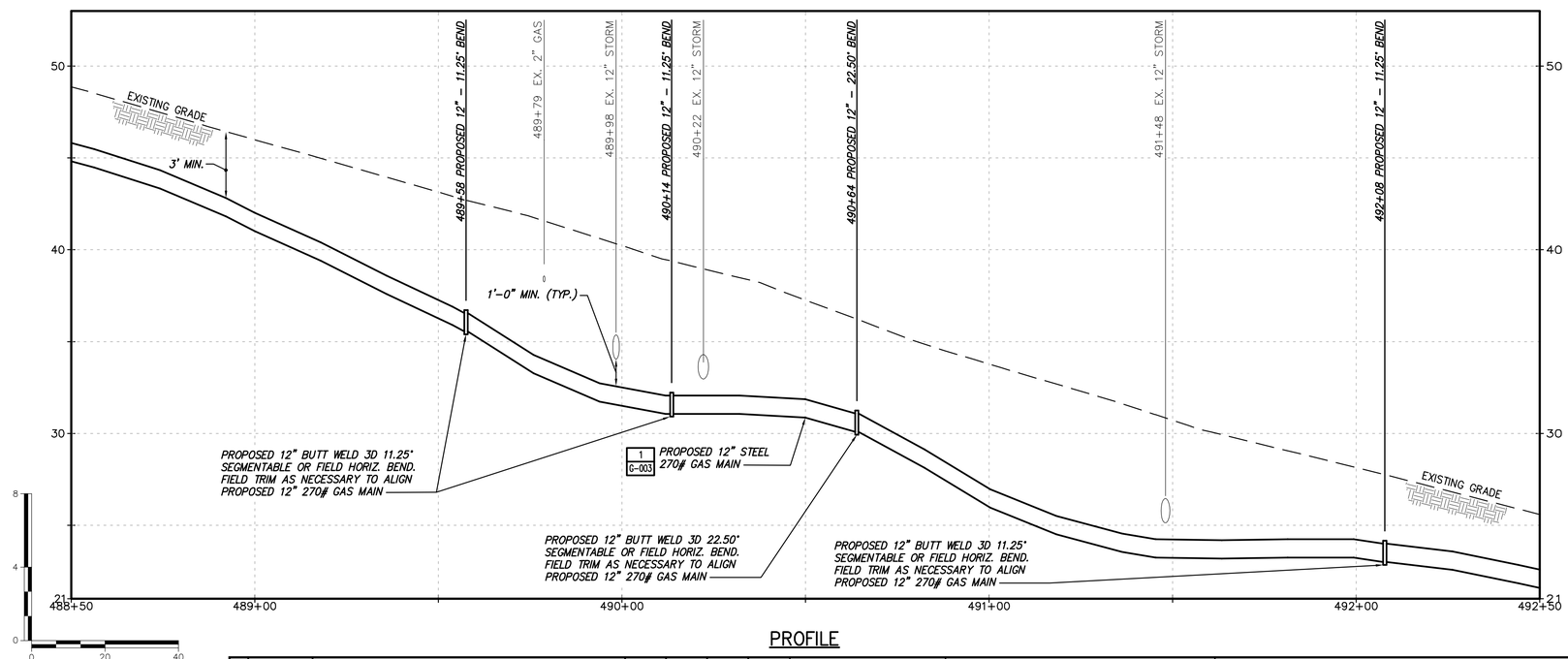
DRAWING NUMBER
C-193

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-193-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-193-29847		C-193

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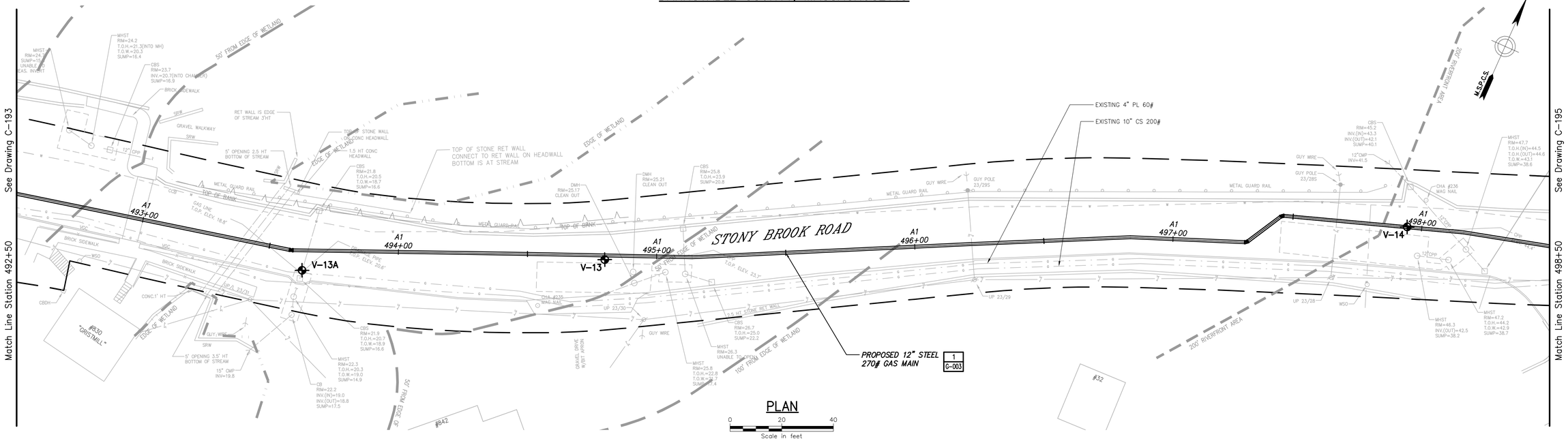
DRAWING NUMBER C-194

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



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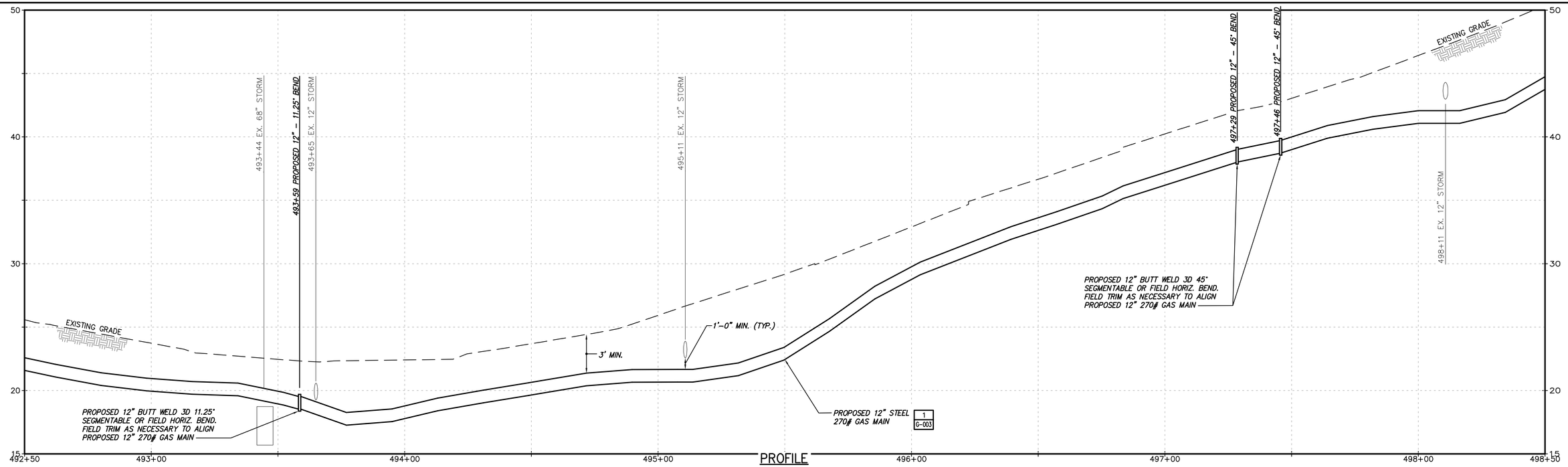

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-194-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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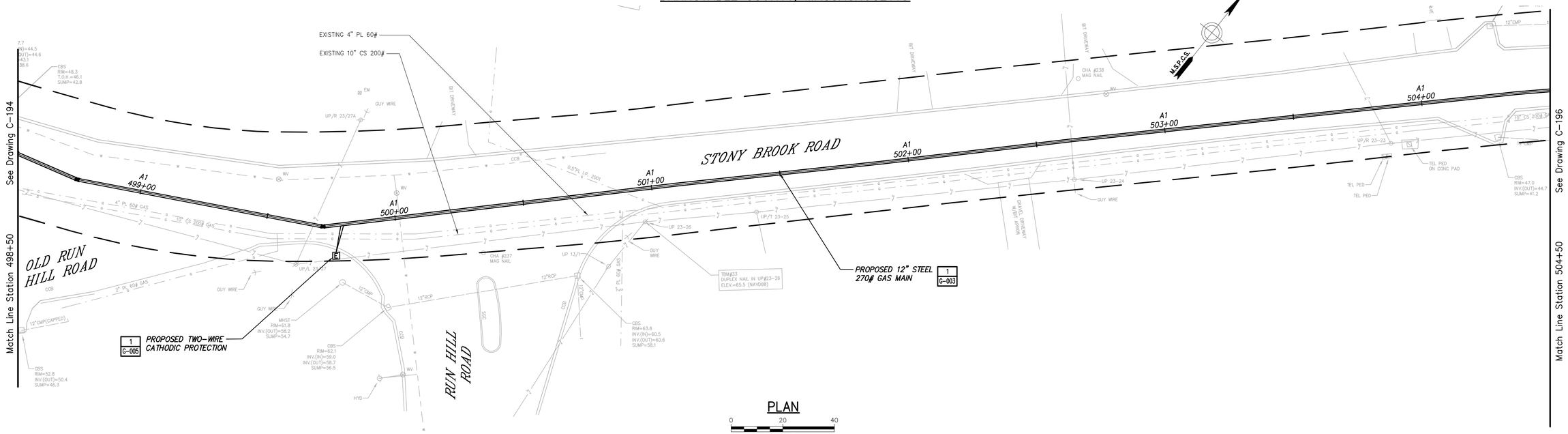
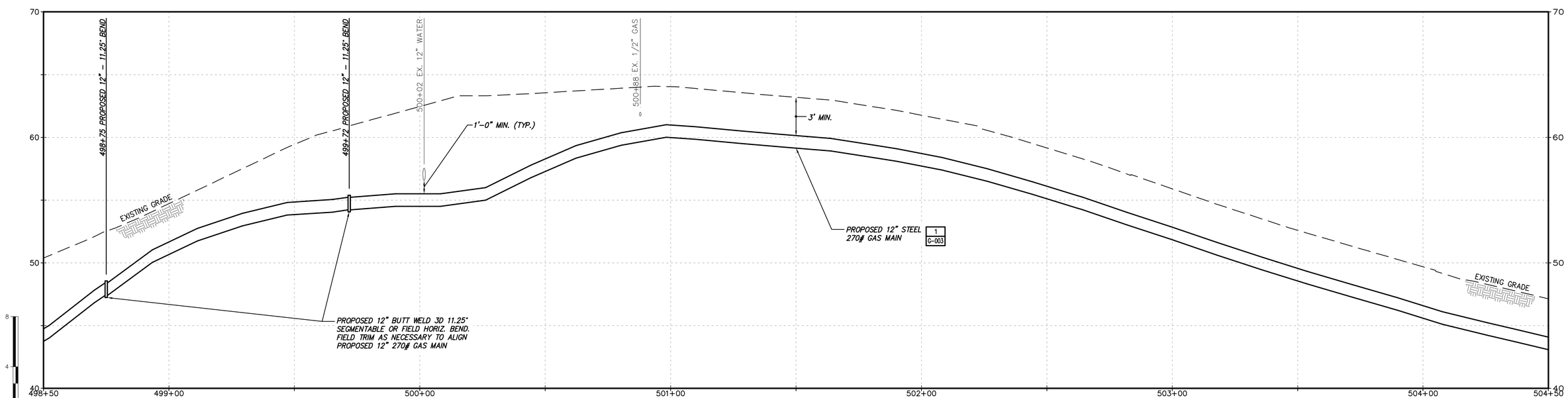
DRAWING NUMBER
C-195

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-195-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-195-29847		C-195

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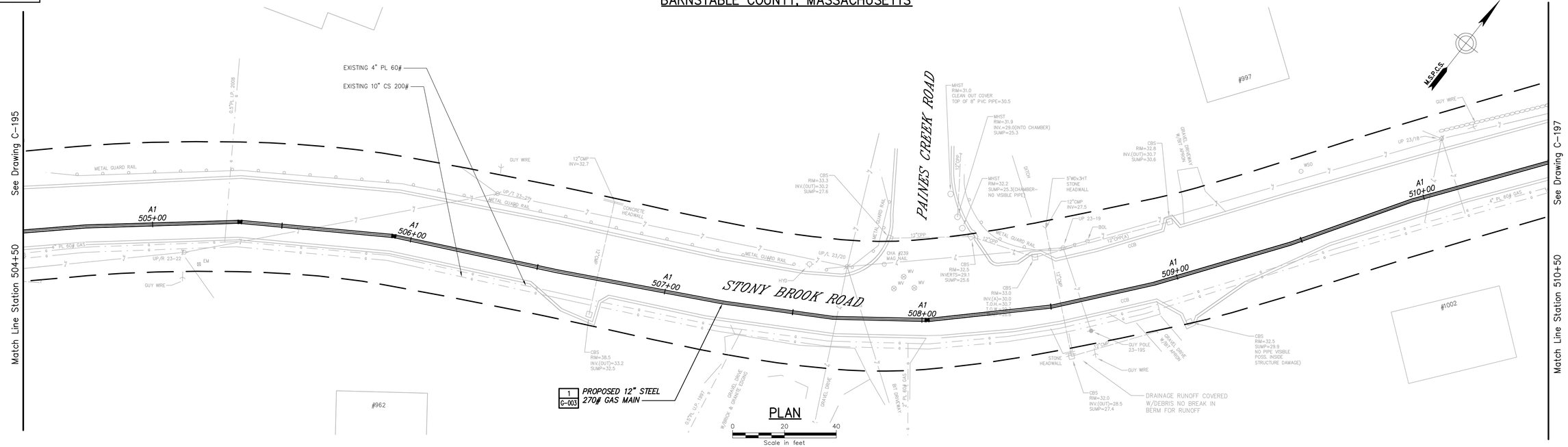
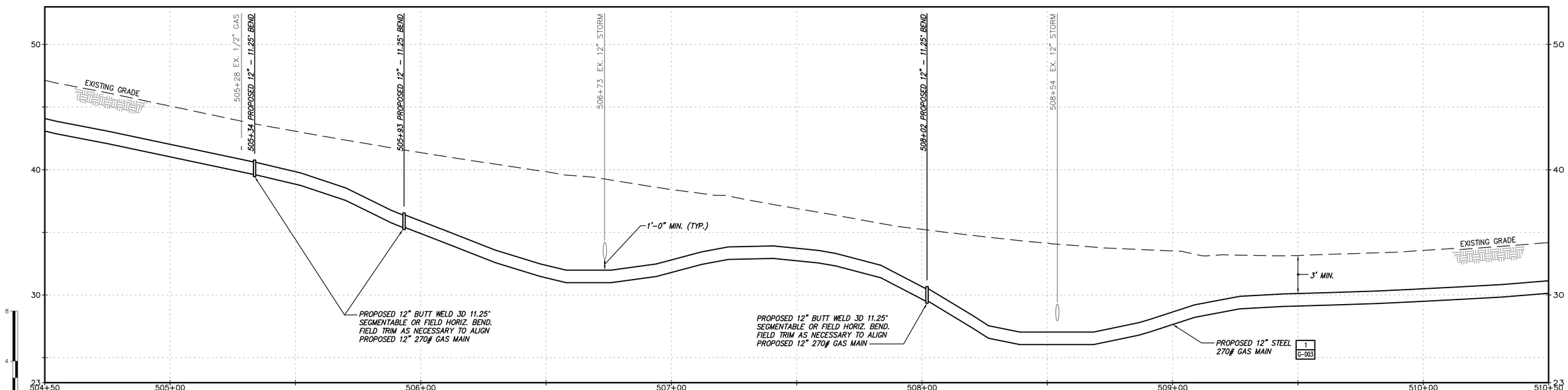
DRAWING NUMBER
C-196

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet 0 20 40



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-196-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-196-29847		C-196

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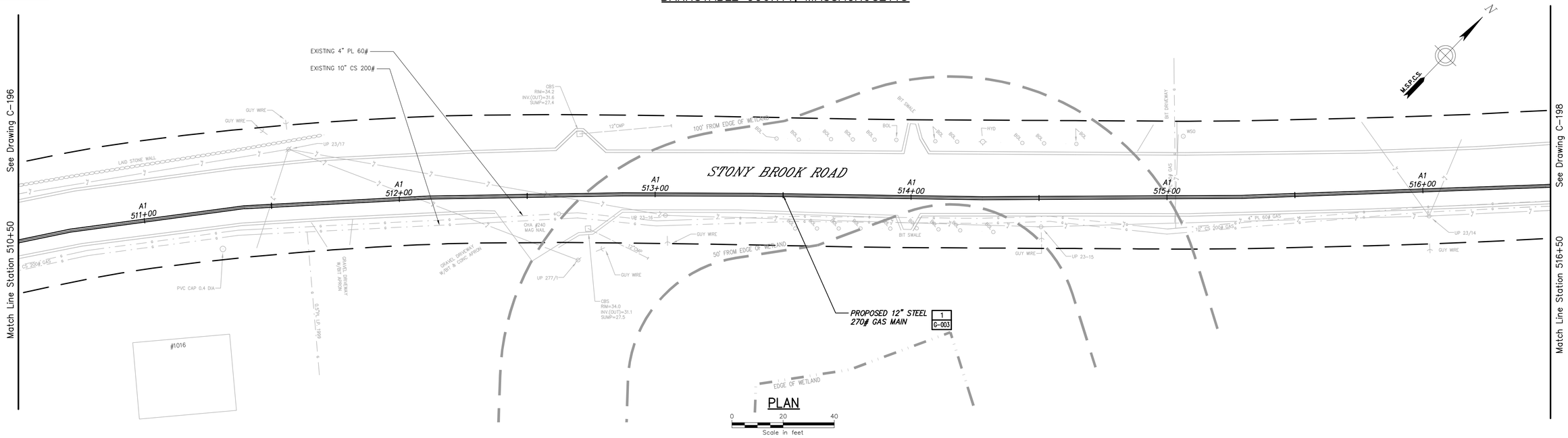
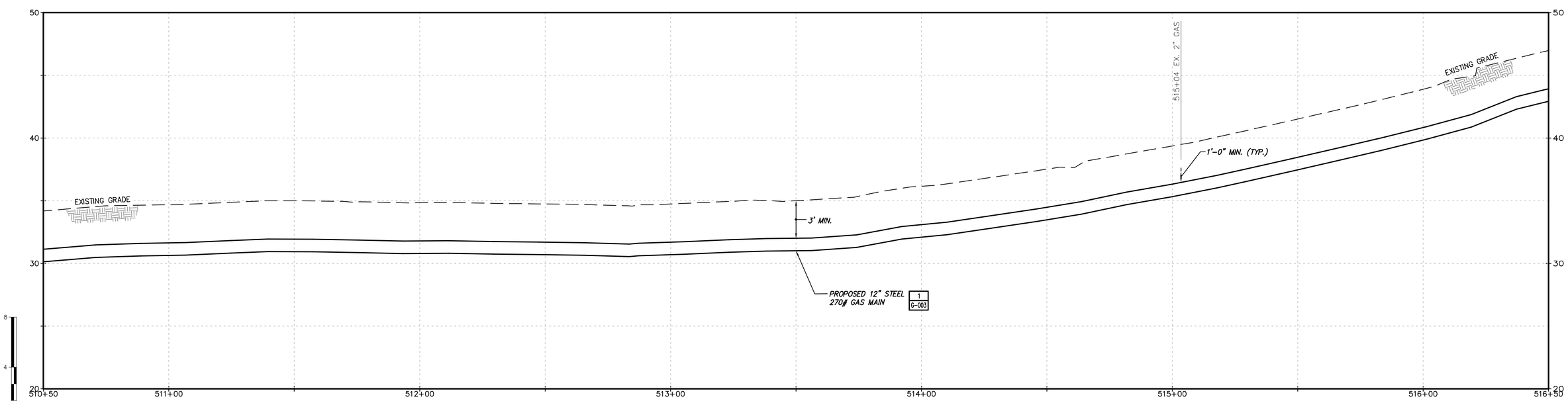
DRAWING NUMBER C-197

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-197-29847

CAD FILE NAME: C-197-29847
SEQUENCE No.
DRAWING NUMBER: C-197

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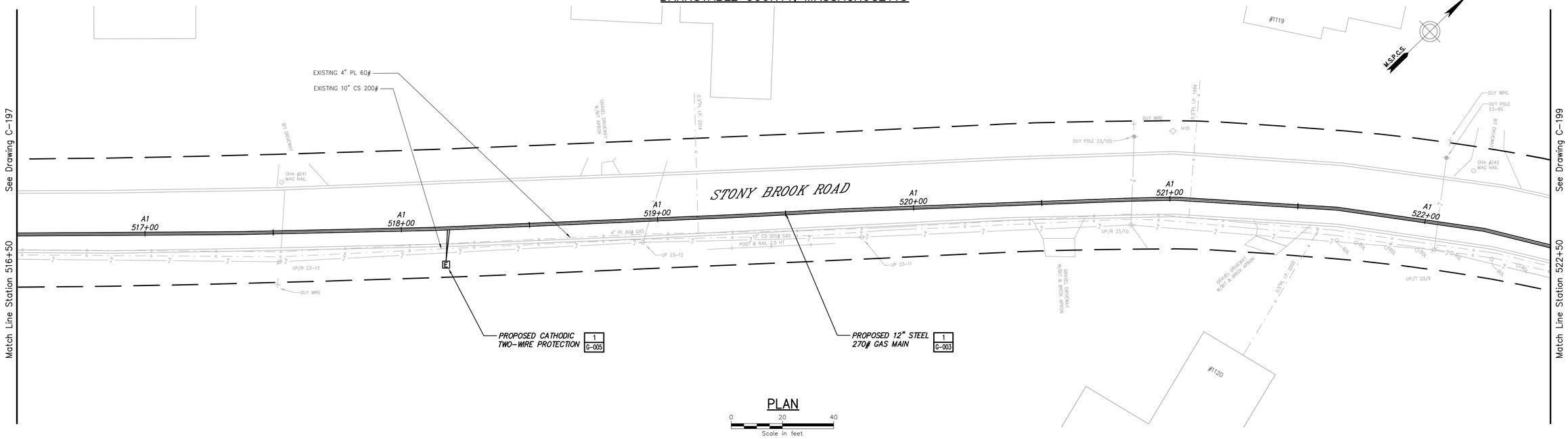
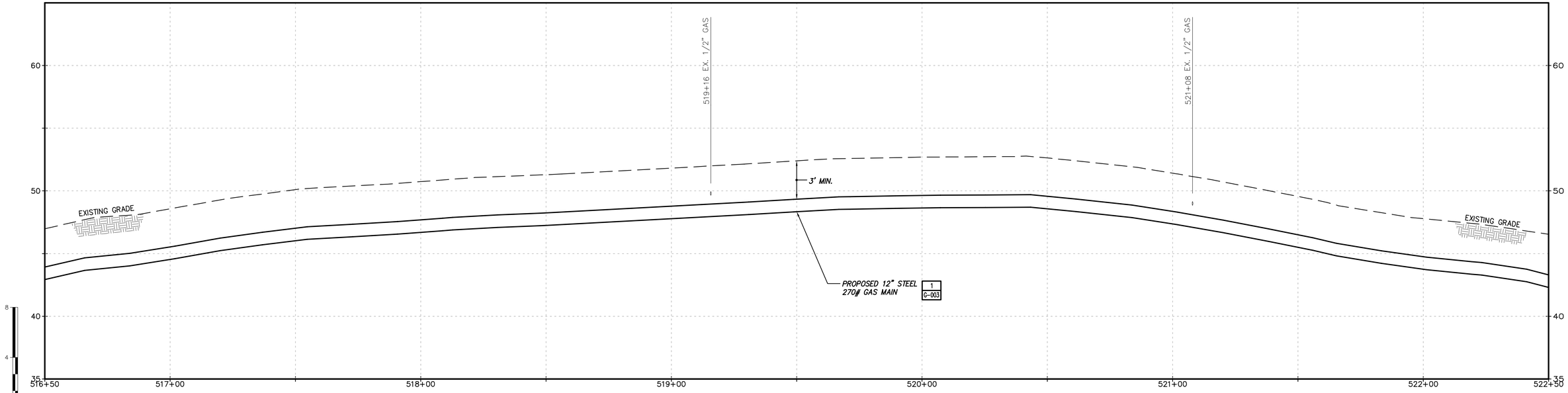
DRAWING NUMBER C-198

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-198-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-198-29847		C-198

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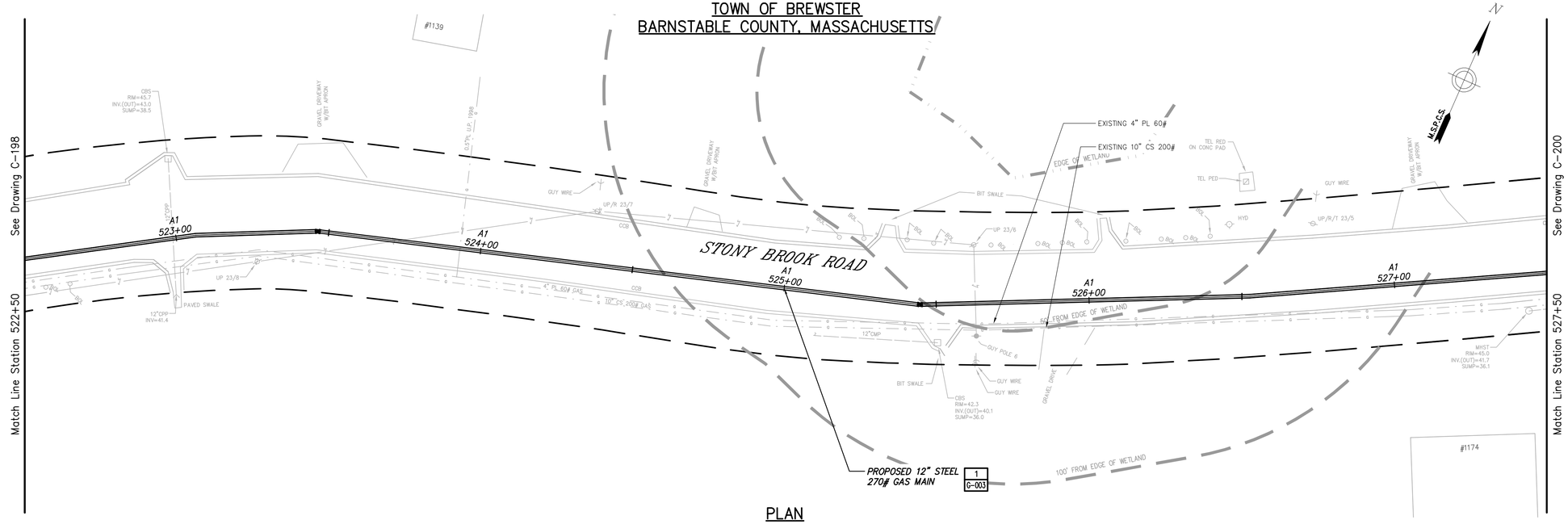
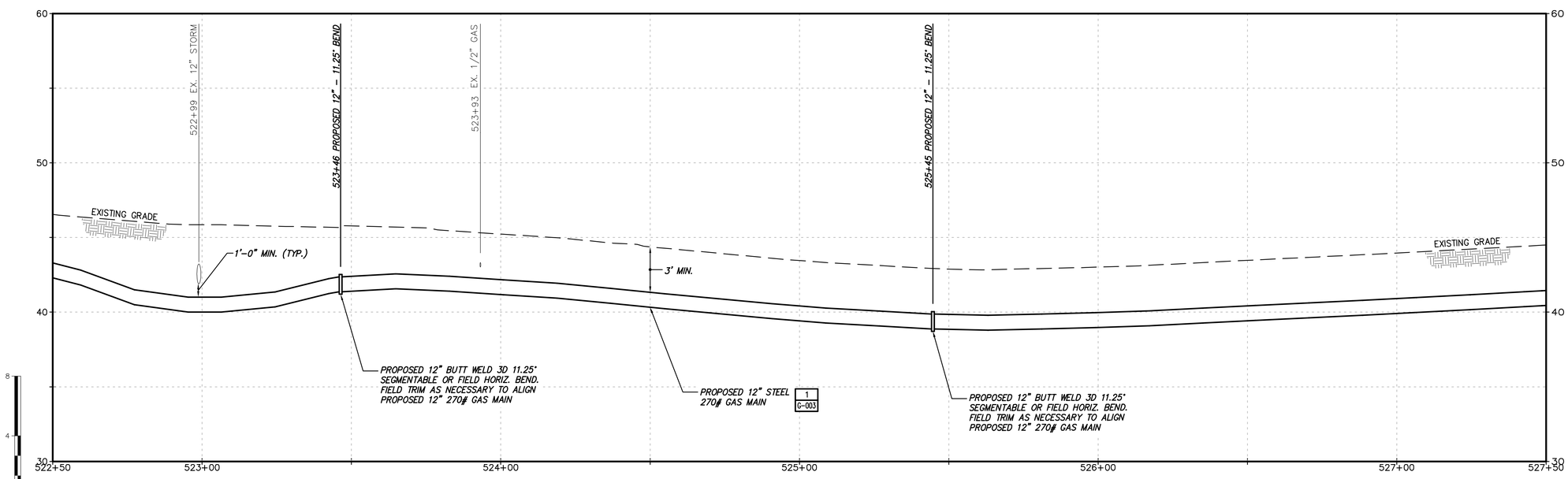
DRAWING NUMBER
C-199

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-199-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-199-29847		C-199

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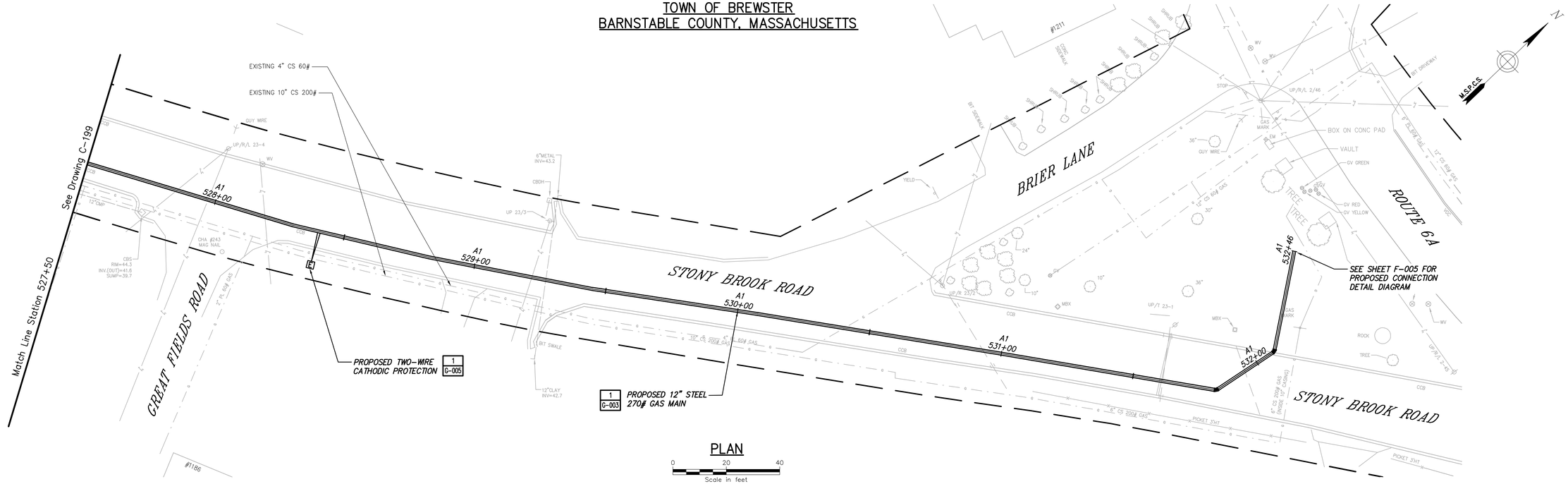
DRAWING NUMBER
C-200

TOWN OF BREWSTER
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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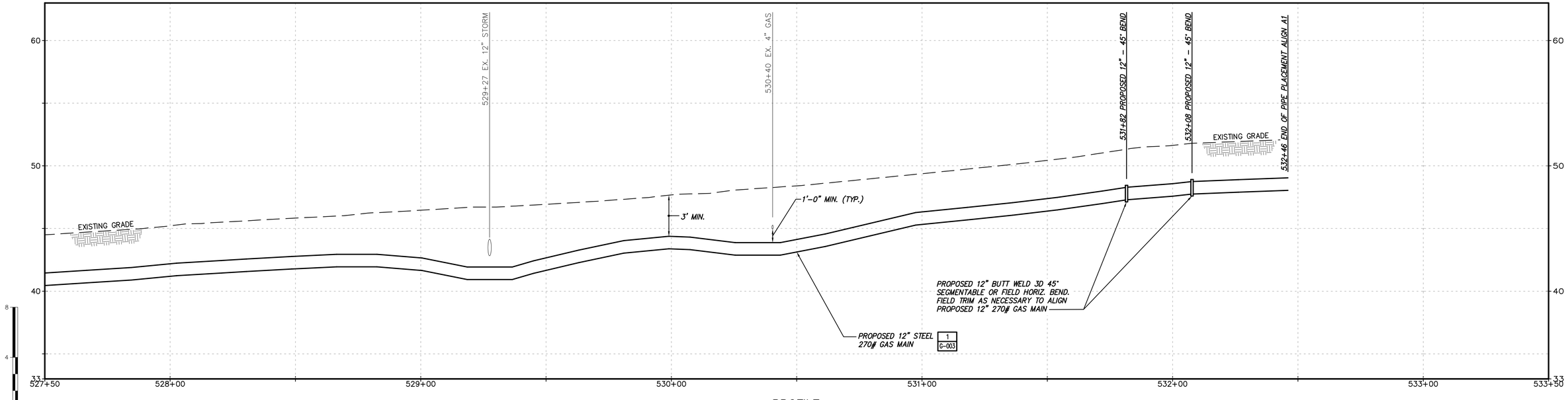
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-200-29847

CAD FILE NAME: C-200-29847
SEQUENCE No.:
DRAWING NUMBER: C-200

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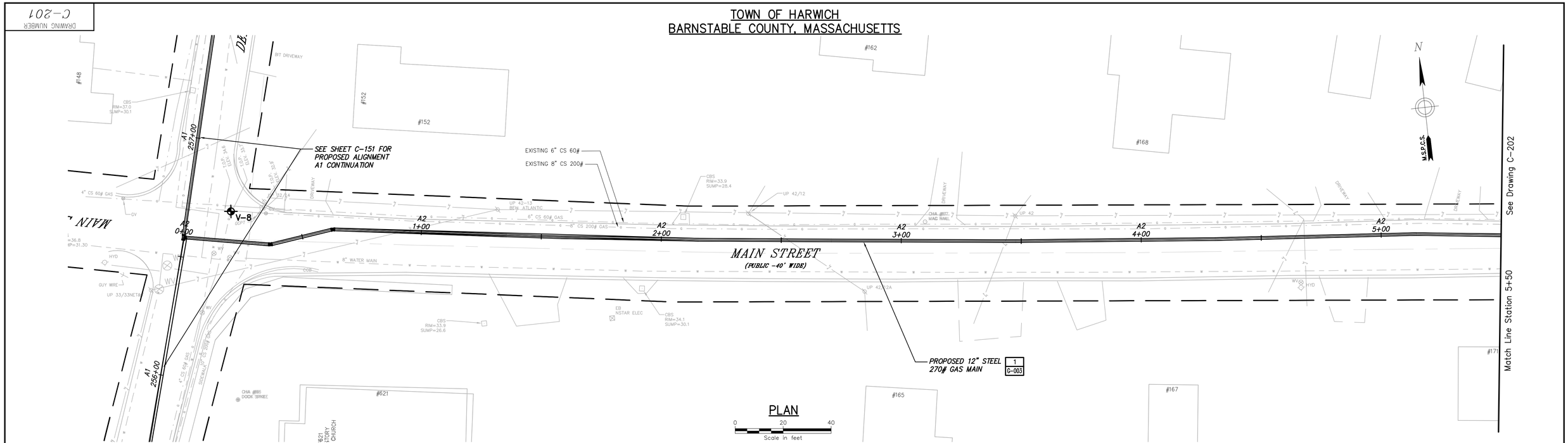
DRAWING NUMBER C-201

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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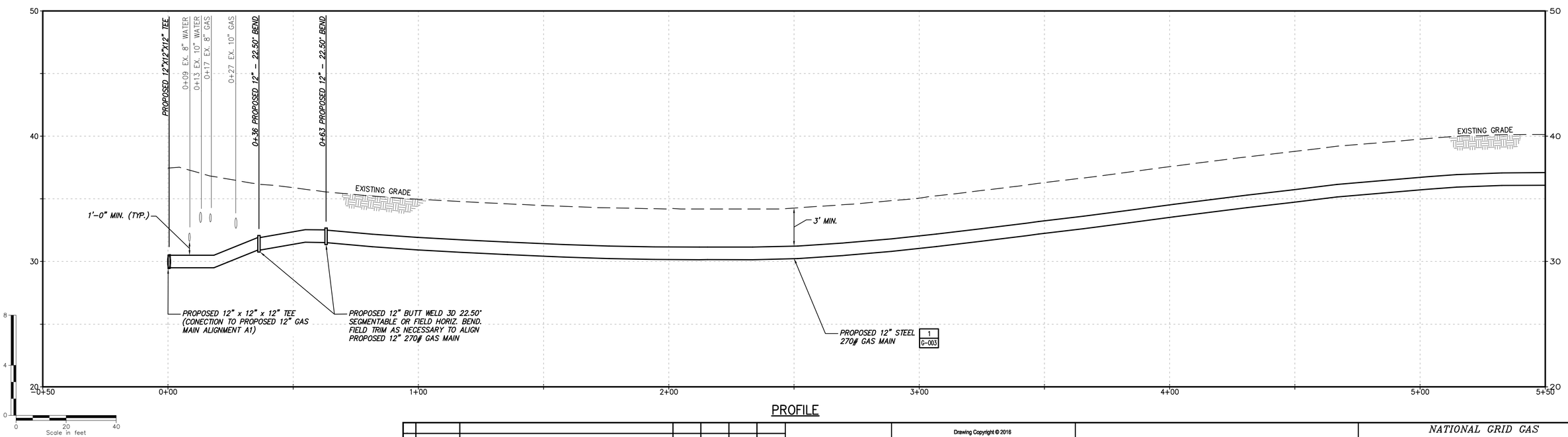

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-201-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-201-29847	SEQUENCE No.	DRAWING NUMBER C-201
Chkd. BCK	Design Engr. CEW	Design Supv. JEO			

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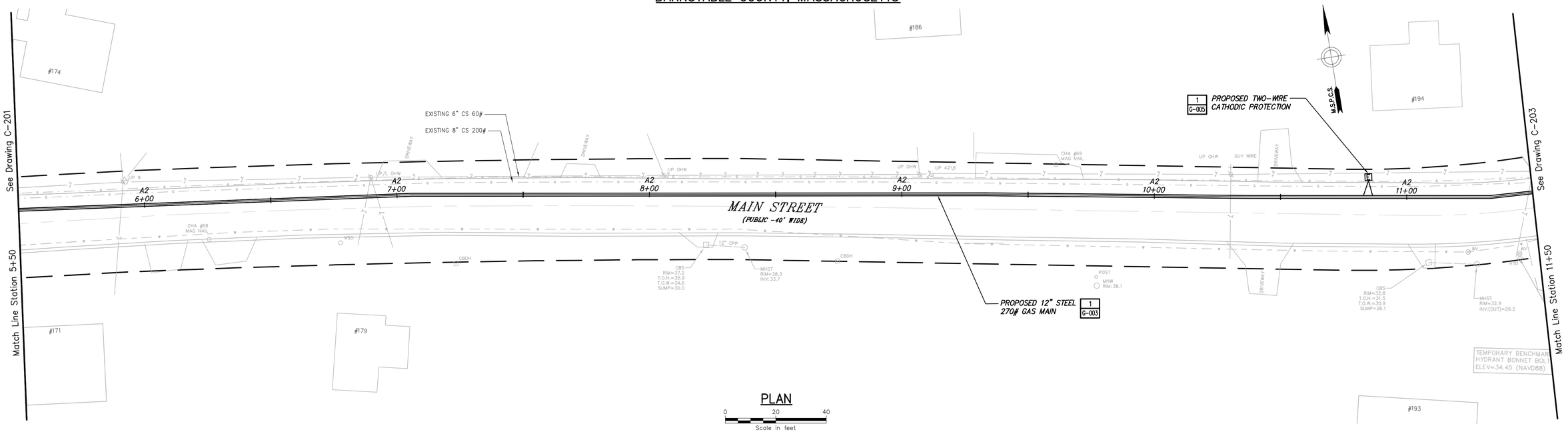
DRAWING NUMBER C-202

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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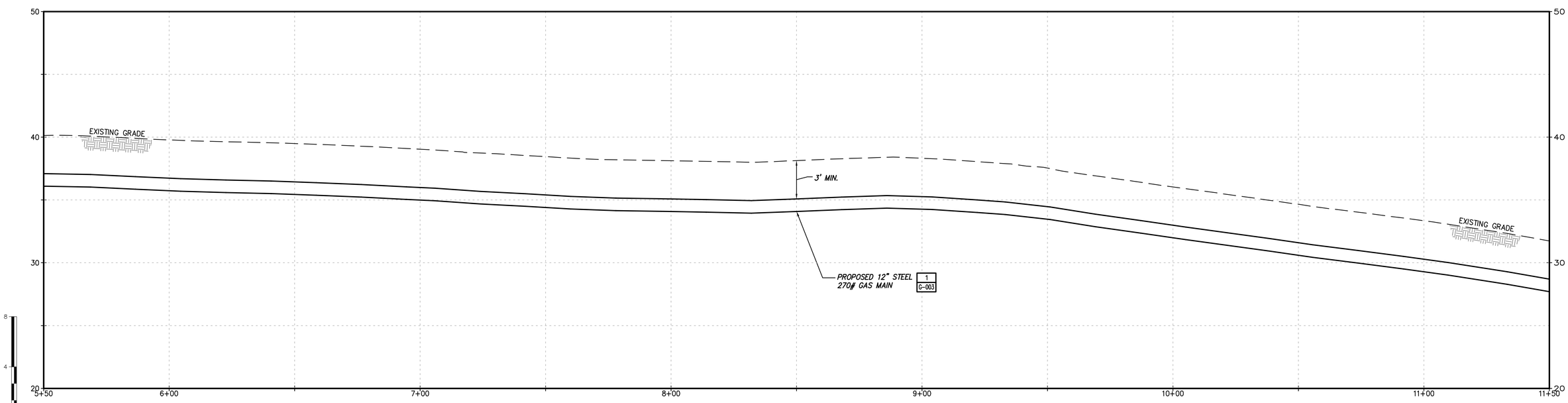
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-202-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
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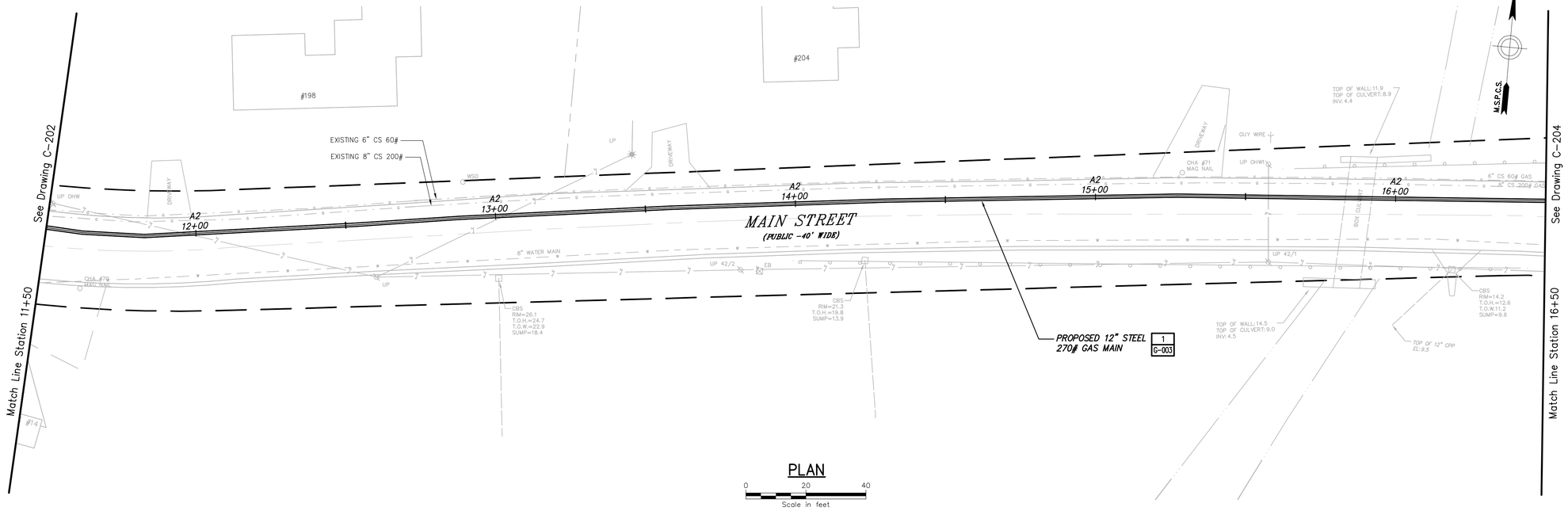
DRAWING NUMBER C-203

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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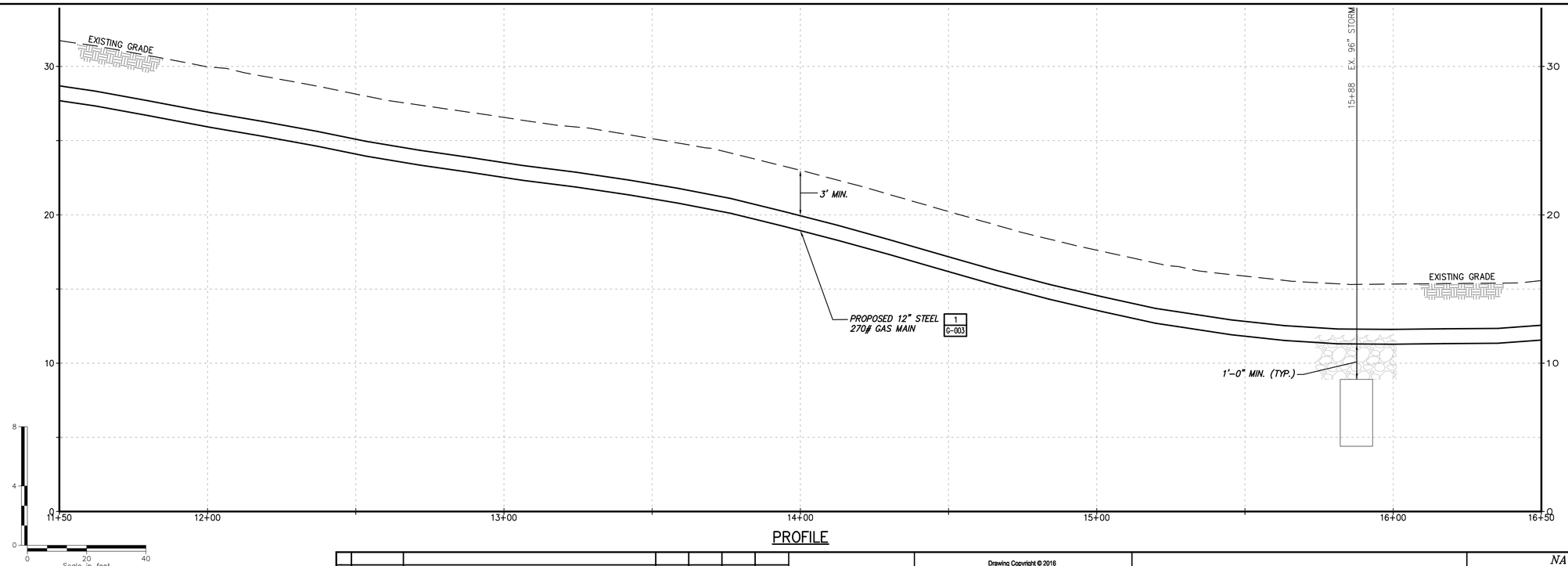

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-203-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-203-29847		C-203

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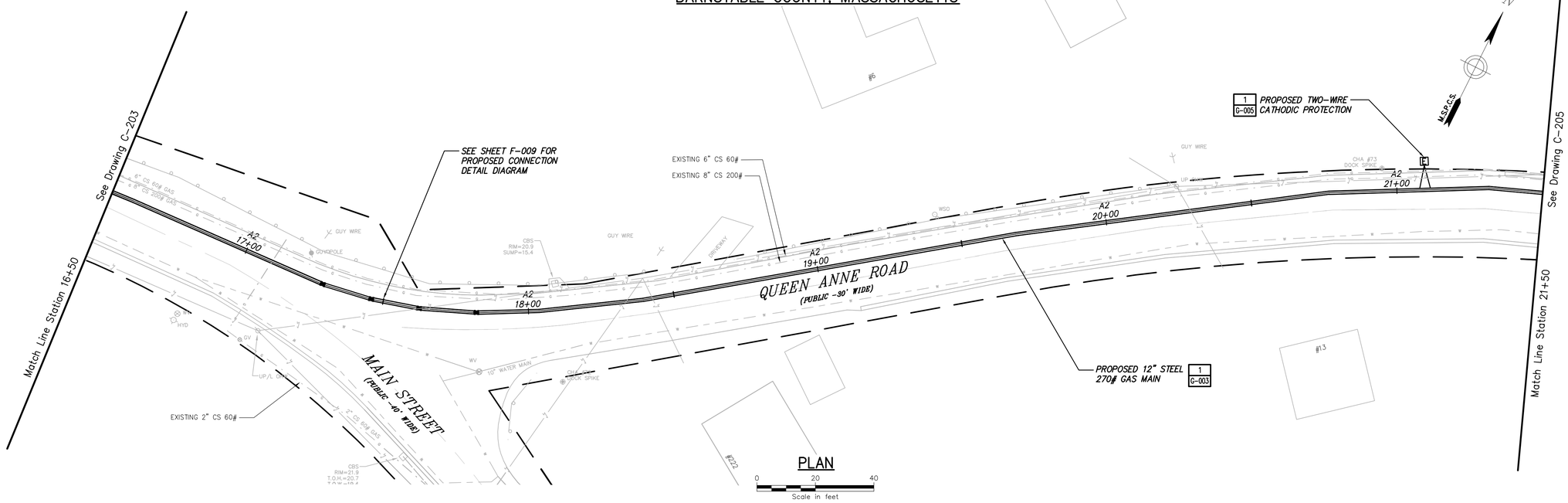
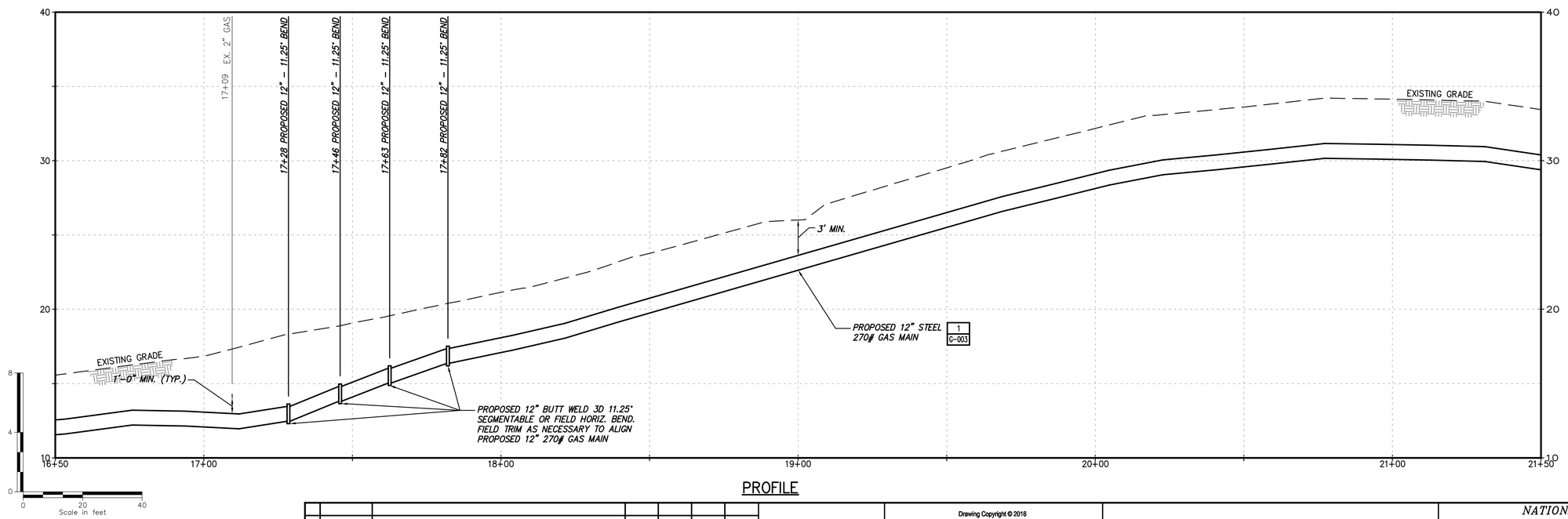
DRAWING NUMBER
C-204

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet 0 20 40



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NATIONAL GRID GAS
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CONSTRUCTION DRAWINGS
C-204-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-204-29847	SEQUENCE No.	DRAWING NUMBER C-204
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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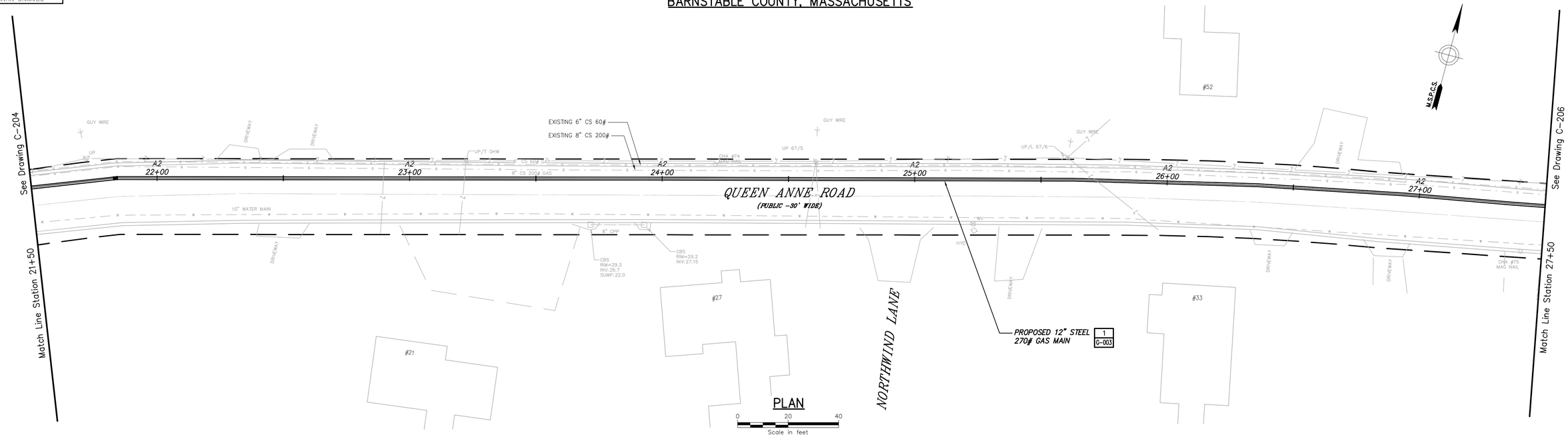
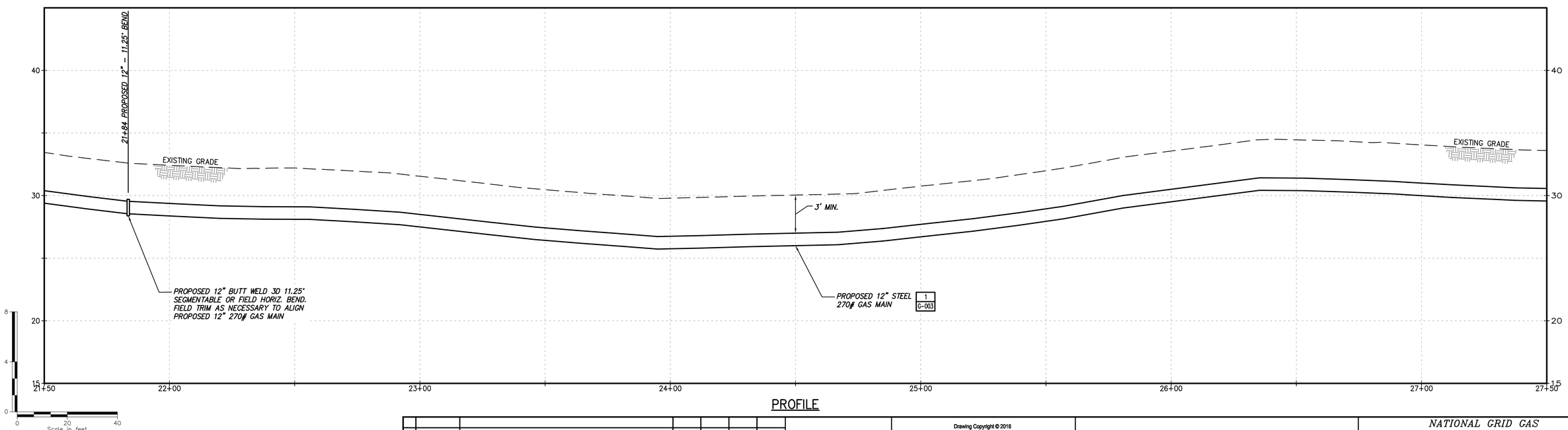
DRAWING NUMBER C-205

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



PROFILE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Drawn RJT	Date 01/22/2016	Scale AS NOTED
Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-205-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-205-29847		C-205

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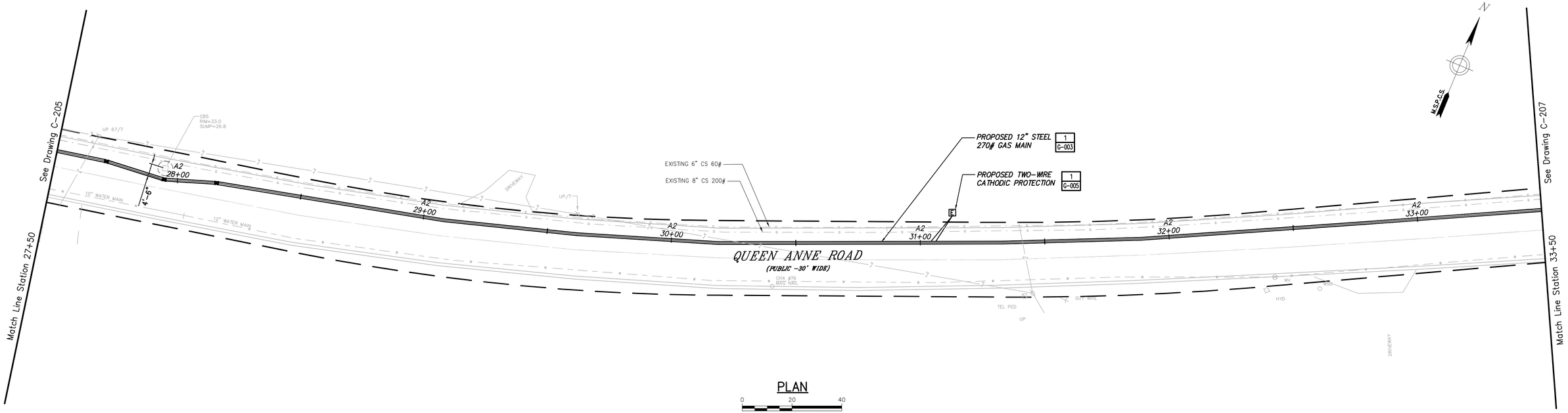
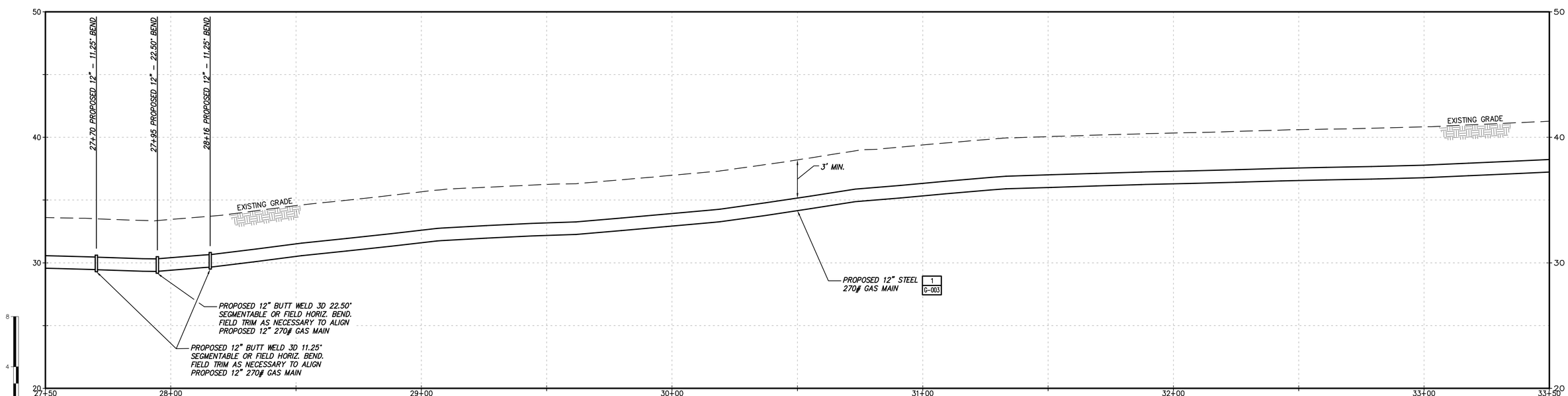
DRAWING NUMBER C-206

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-206-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-206-29847		C-206

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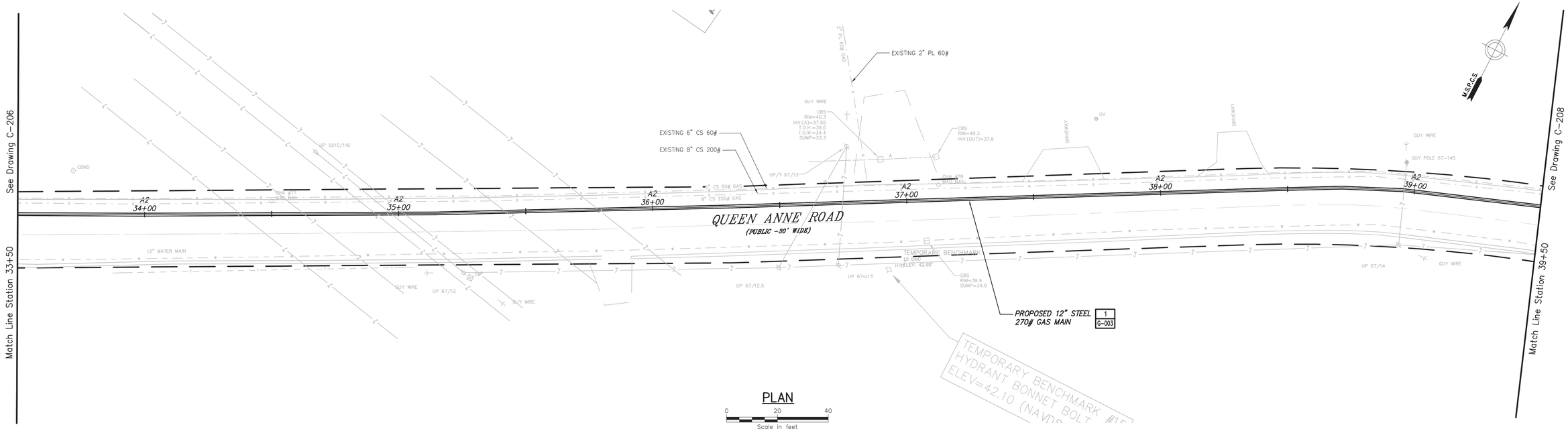
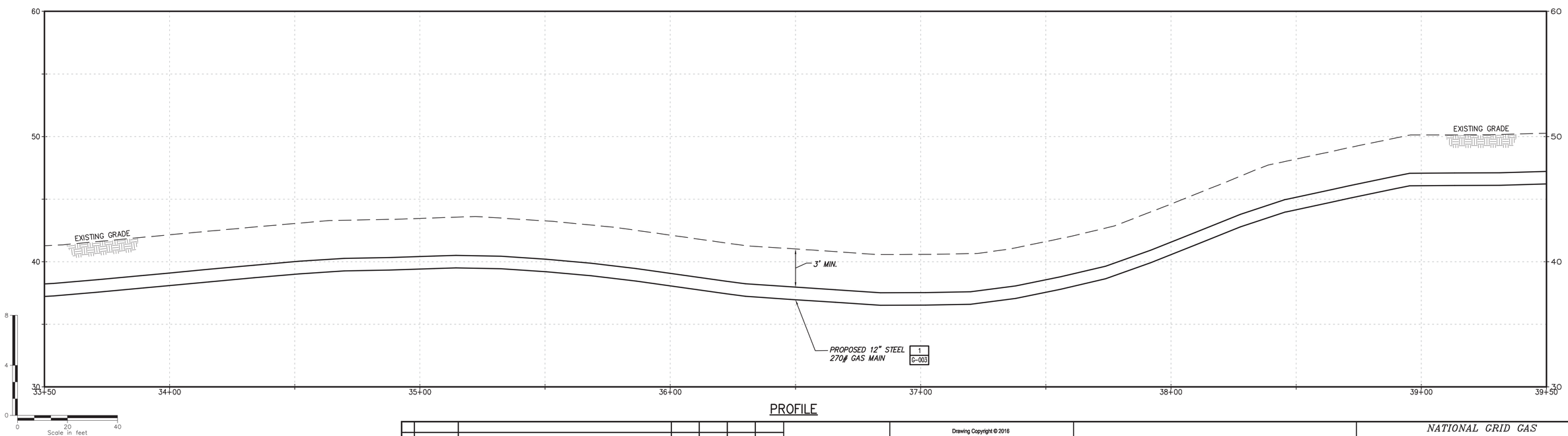
DRAWING NUMBER C-207

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-207-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-207-29847		C-207

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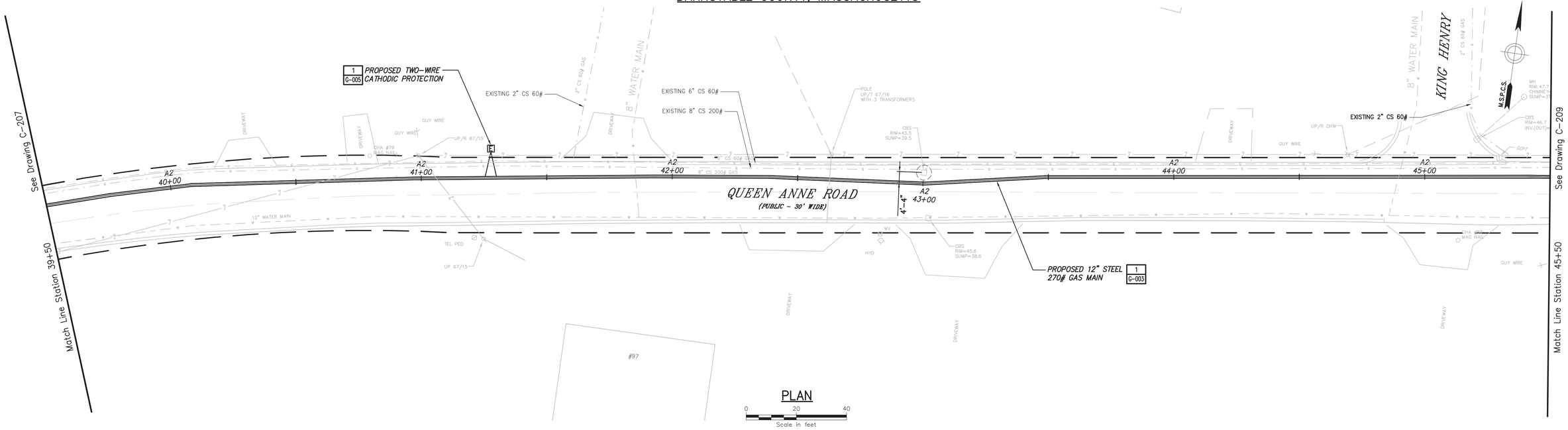
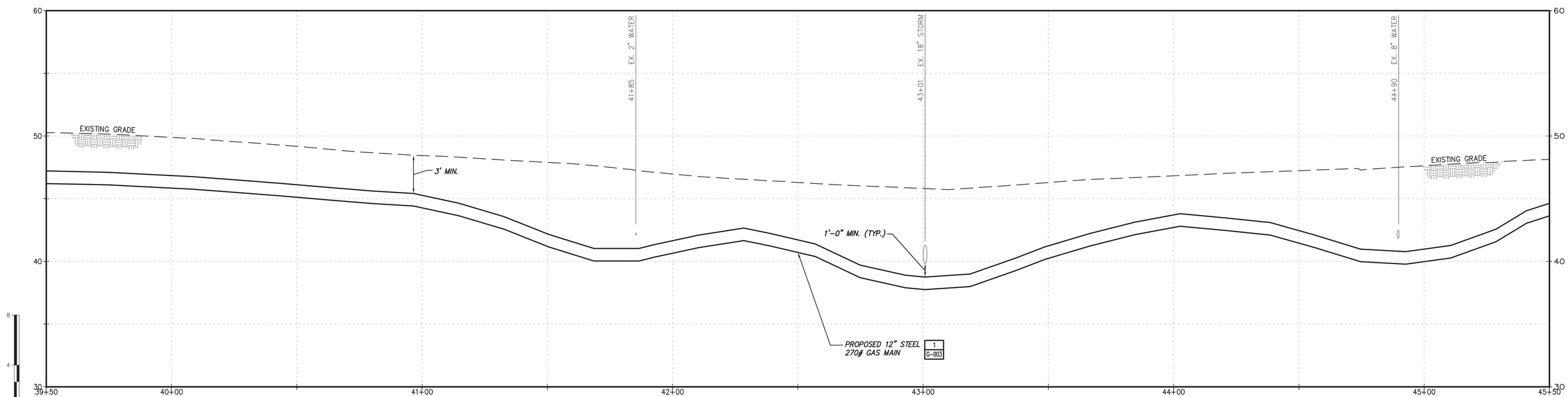
DRAWING NUMBER C-208

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-208-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-208-29847		C-208

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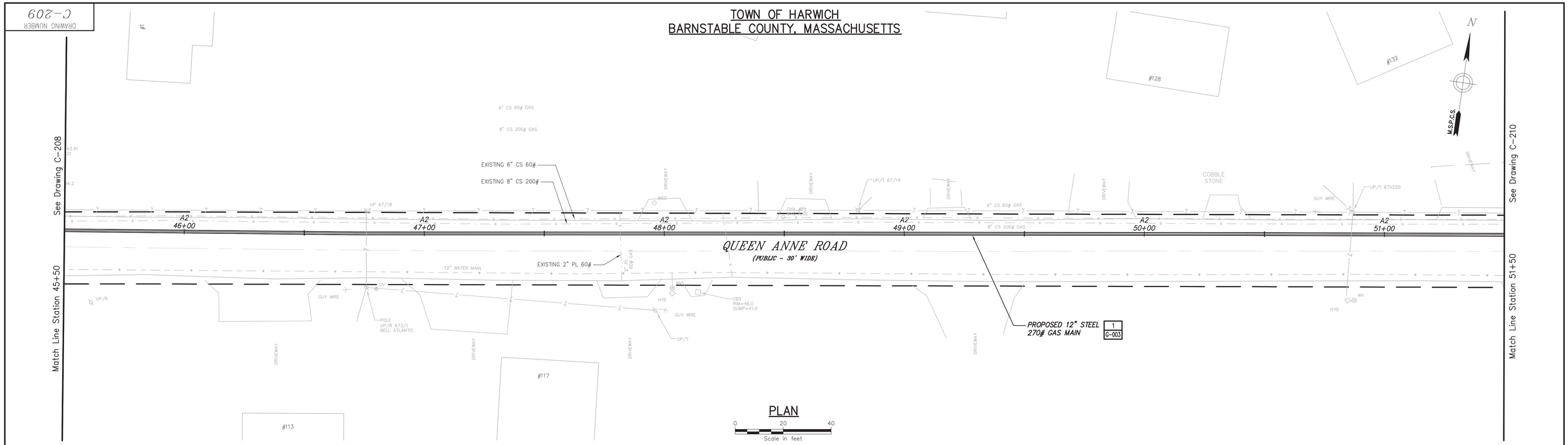
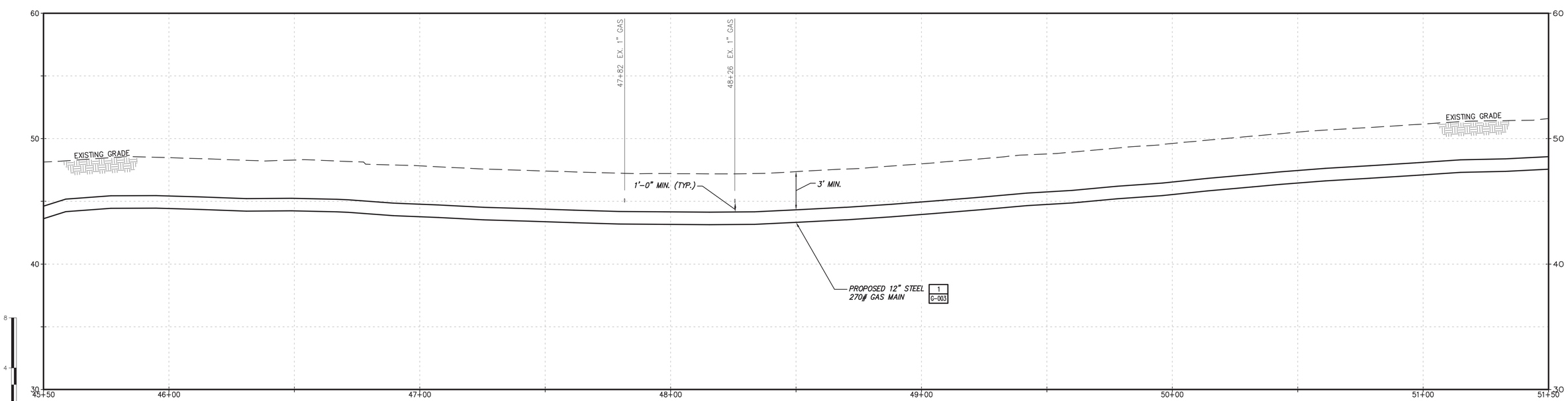
DRAWING NUMBER
C-209

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-209-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-209-29847		C-209

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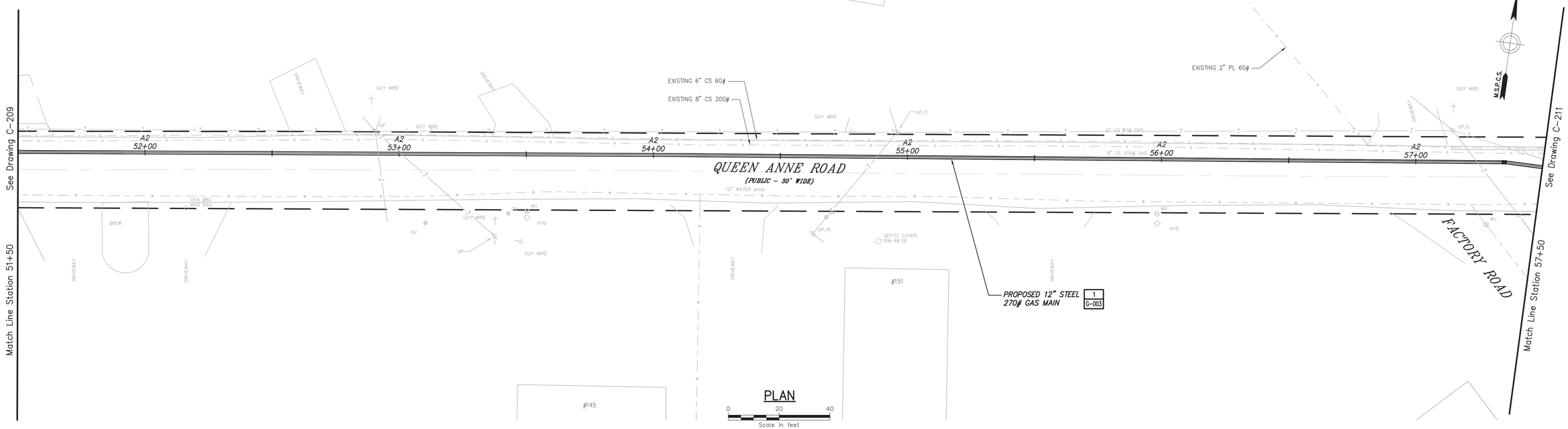
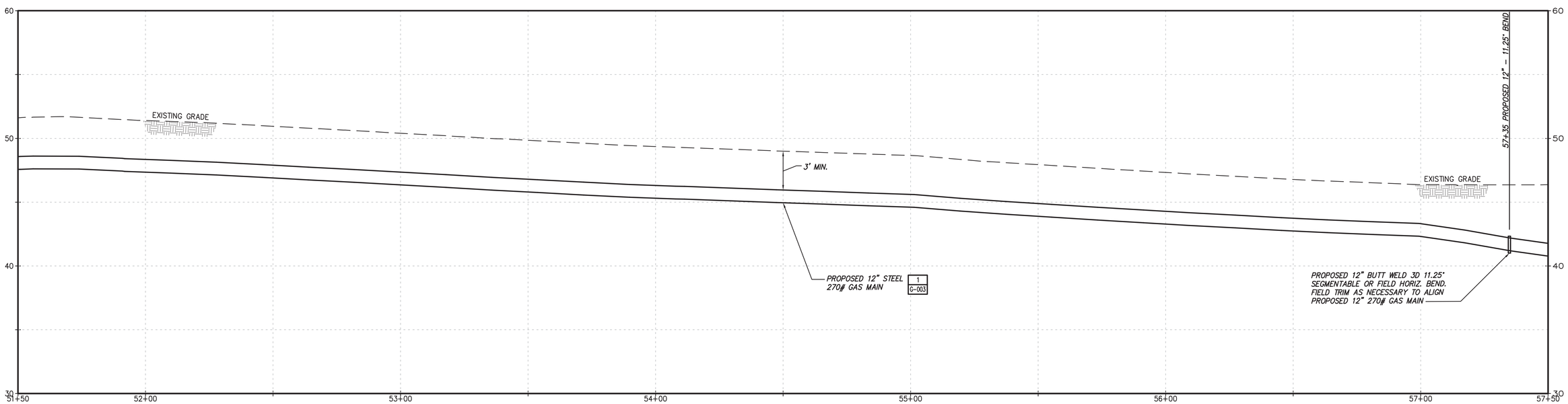
DRAWING NUMBER
C-210

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-210-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-210-29847		C-210

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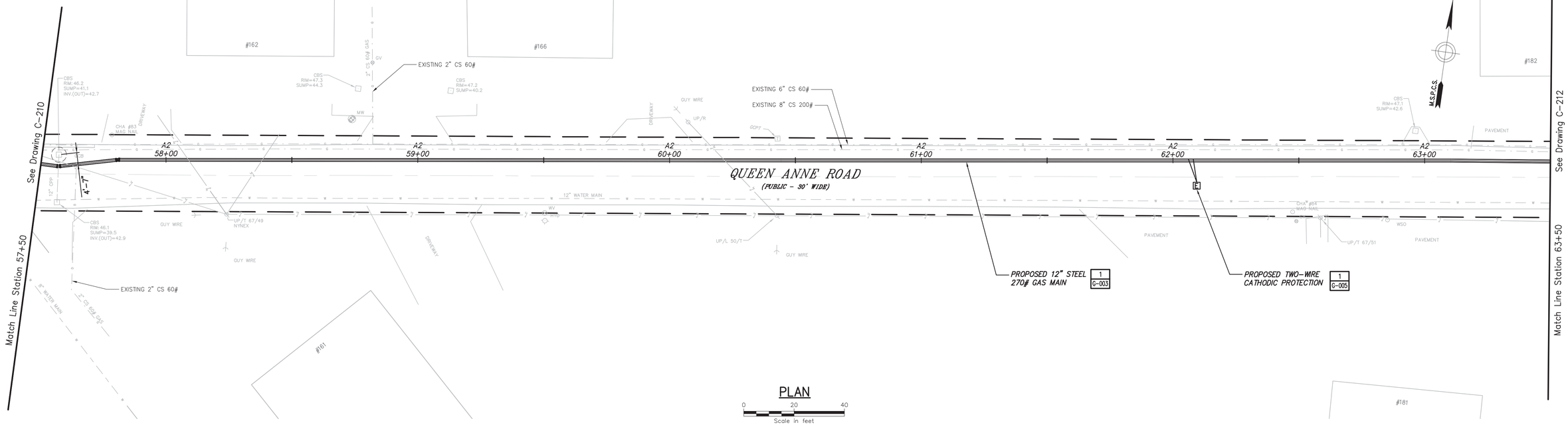
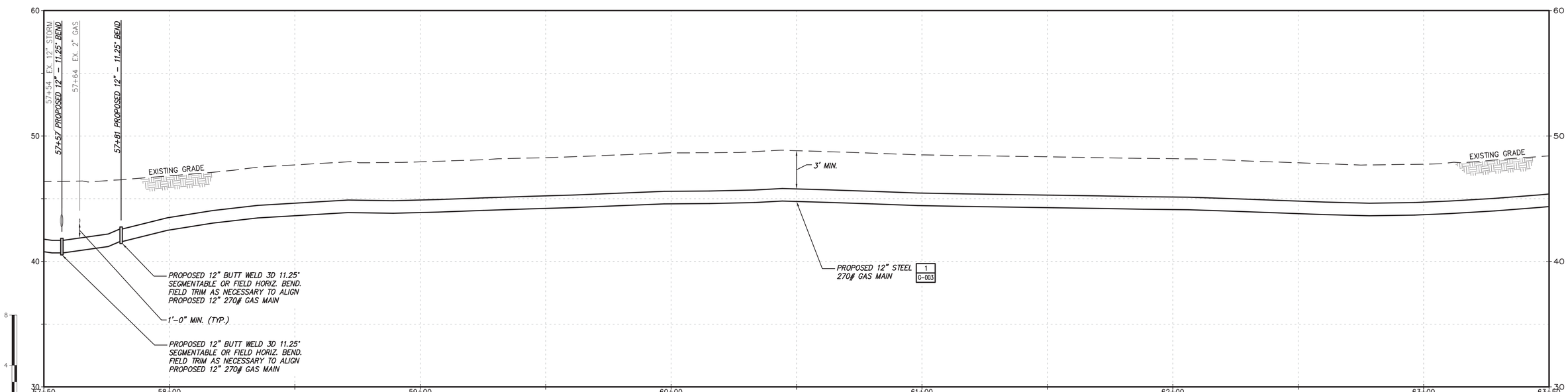
DRAWING NUMBER C-211

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-211-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-211-29847		C-211

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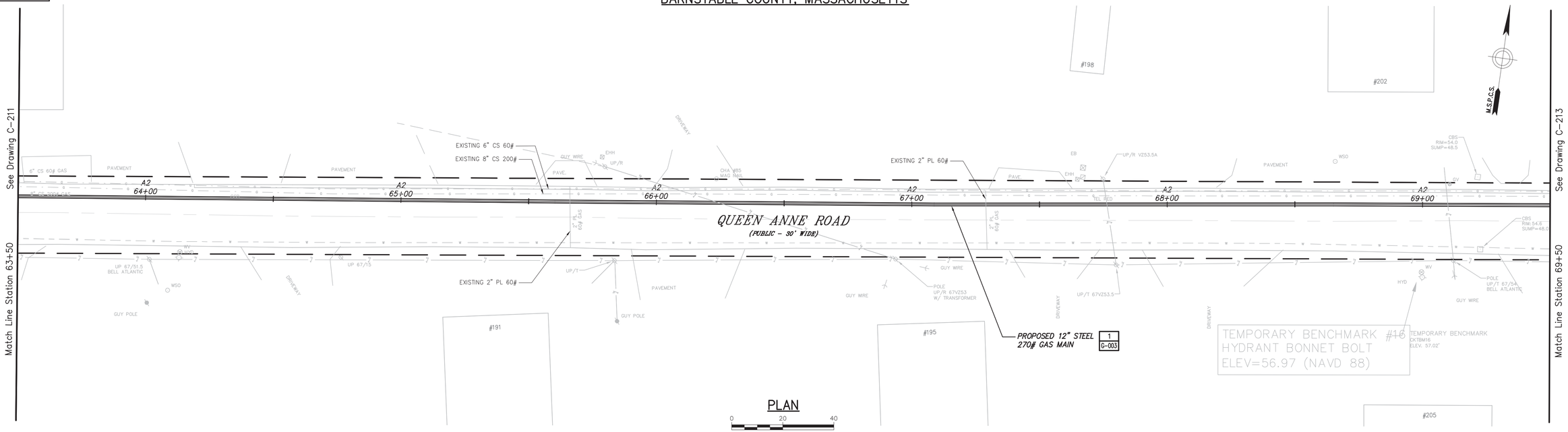
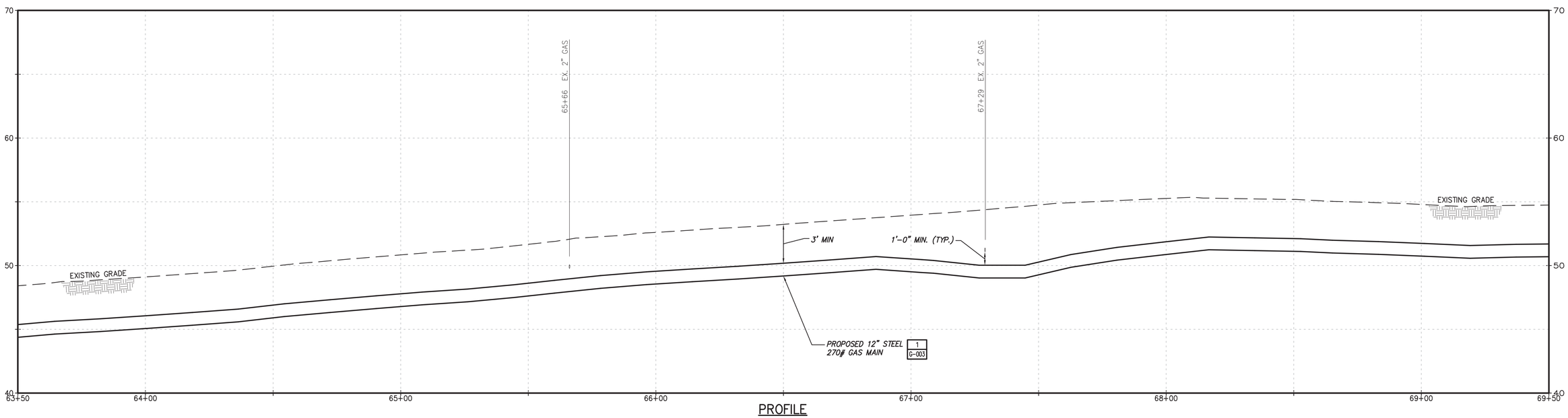
DRAWING NUMBER C-212

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-212-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-212-29847		C-212

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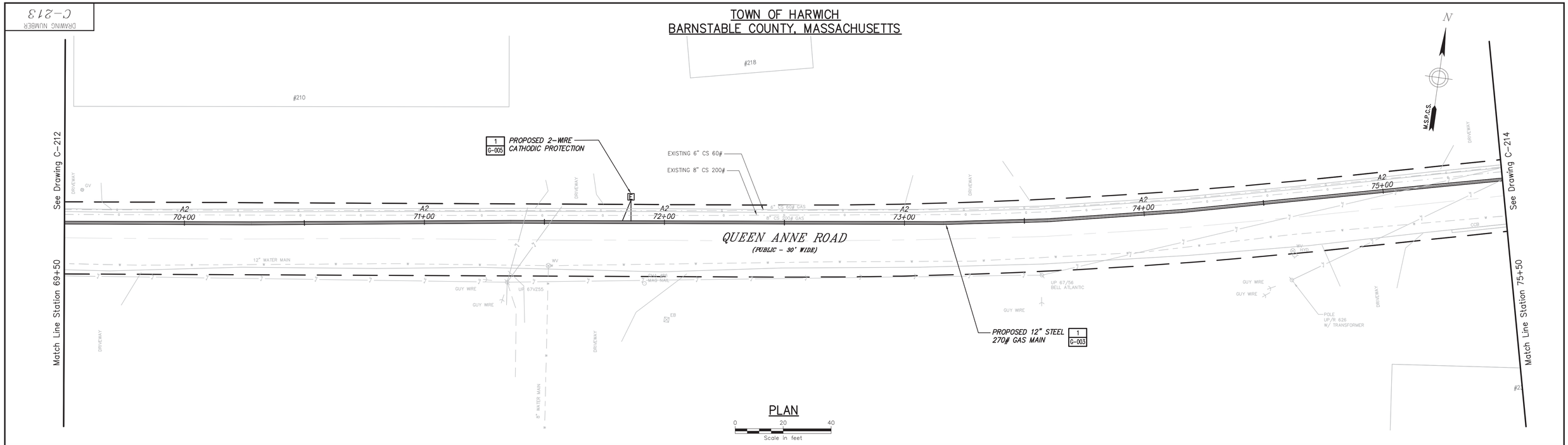
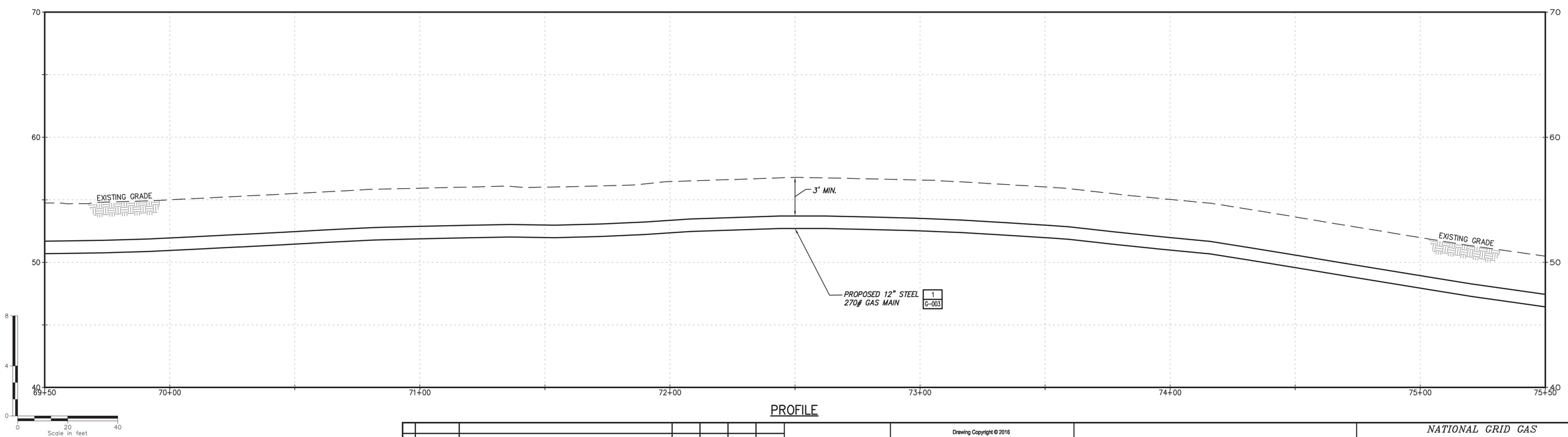
DRAWING NUMBER C-213

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-213-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-213-29847		C-213

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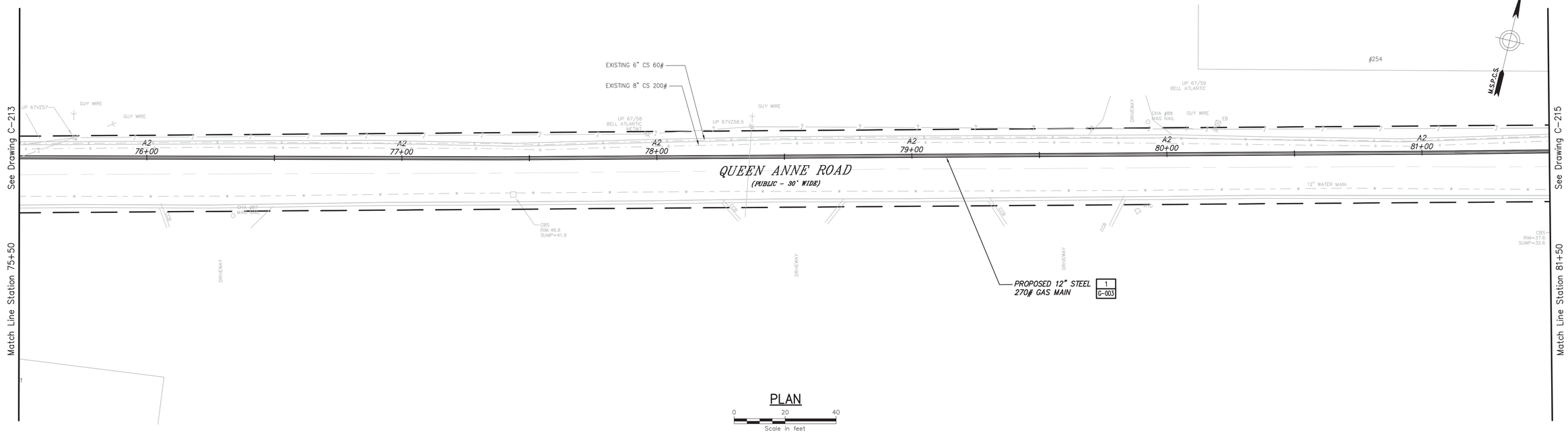
DRAWING NUMBER
C-214

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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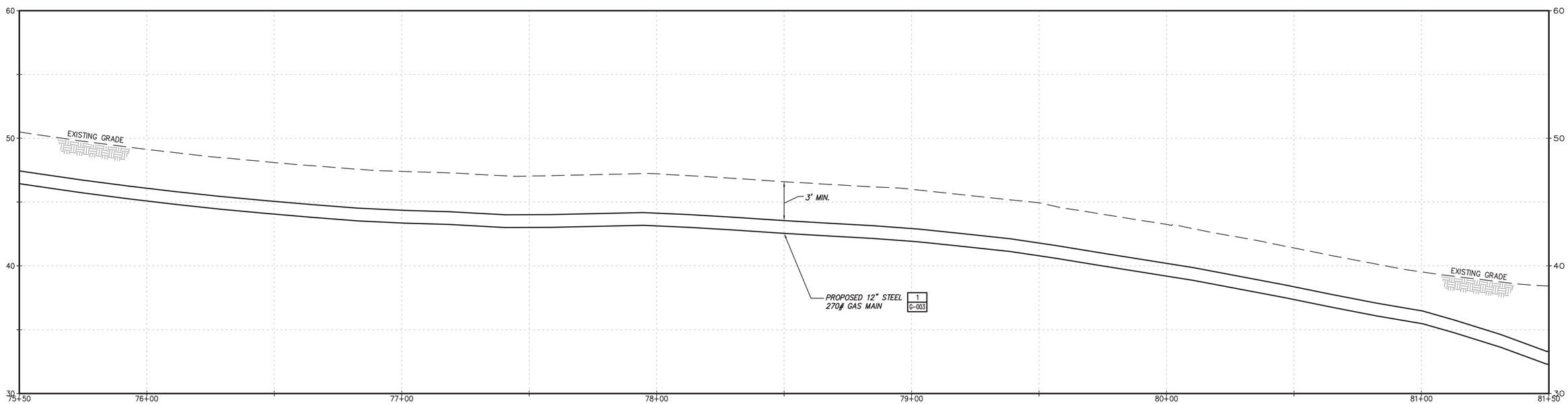
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-214-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-214-29847	SEQUENCE No.	DRAWING NUMBER C-214
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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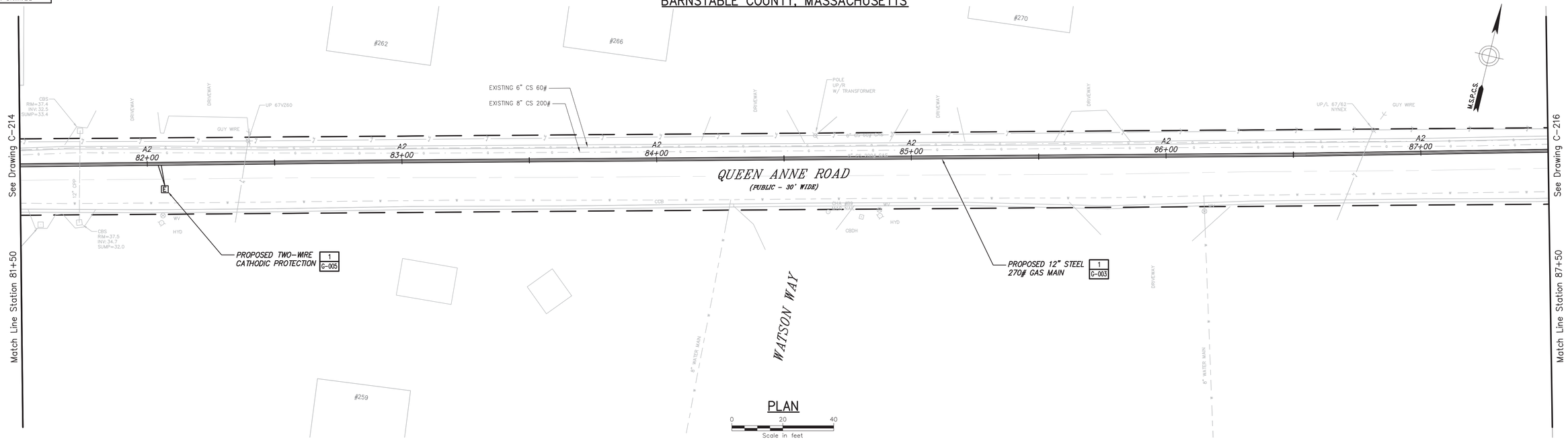
DRAWING NUMBER C-215

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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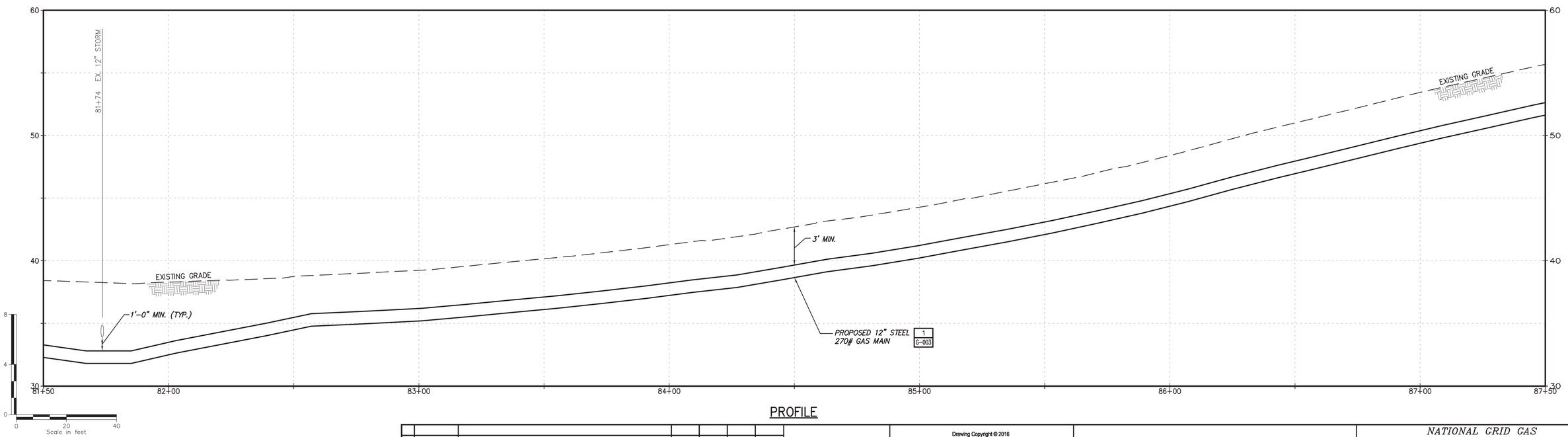
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-215-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-215-29847	SEQUENCE No.	DRAWING NUMBER C-215
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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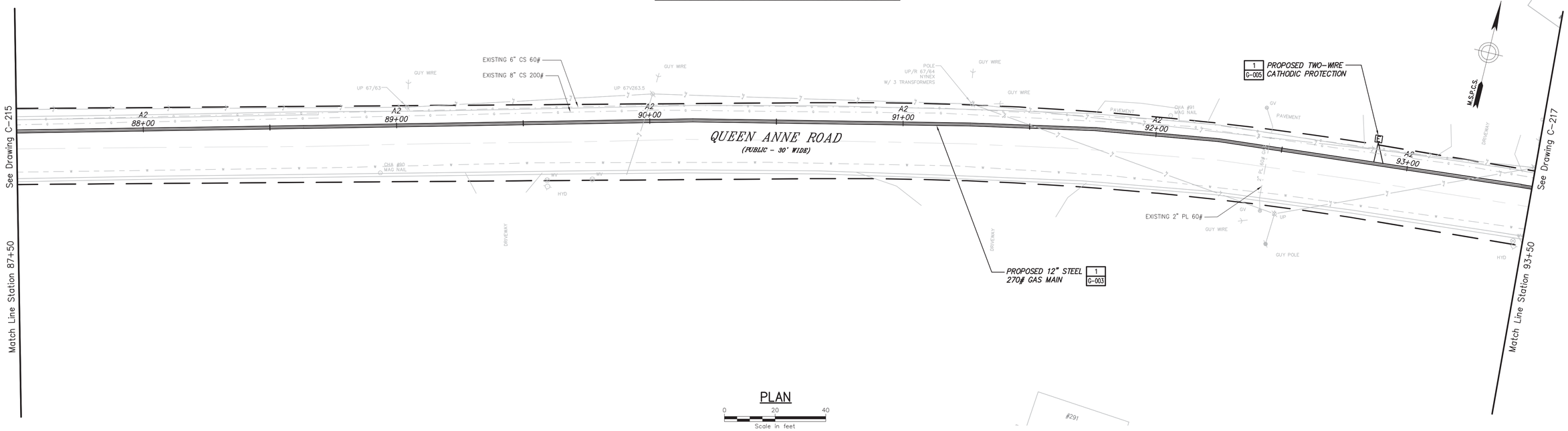
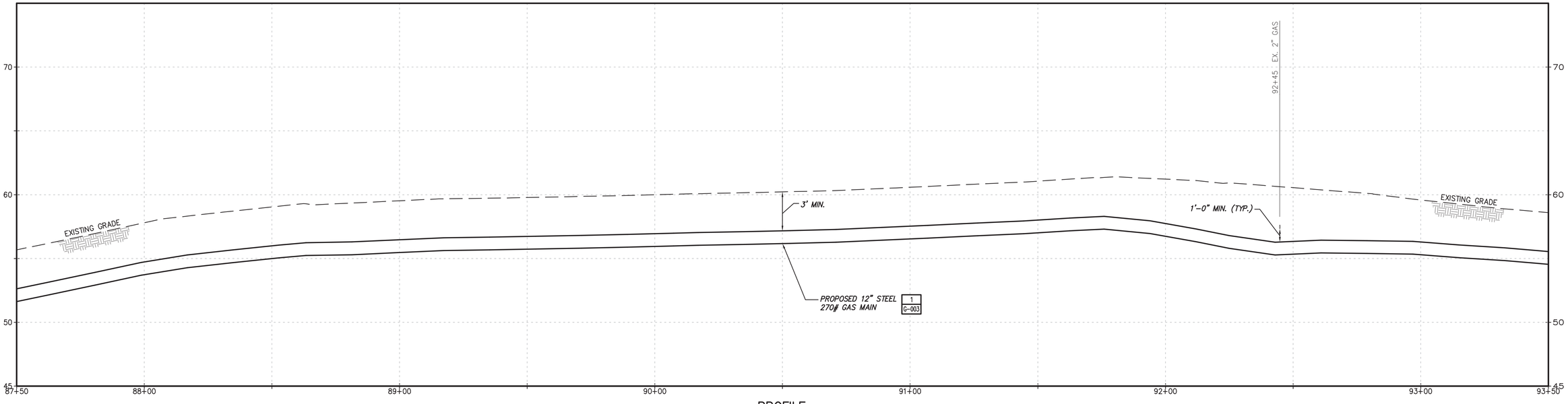
DRAWING NUMBER
C-216

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-216-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-216-29847		C-216

File: V:\PROJECTS\ANY\K4\29847\CADD_ACAD\C-216-29847.DWG
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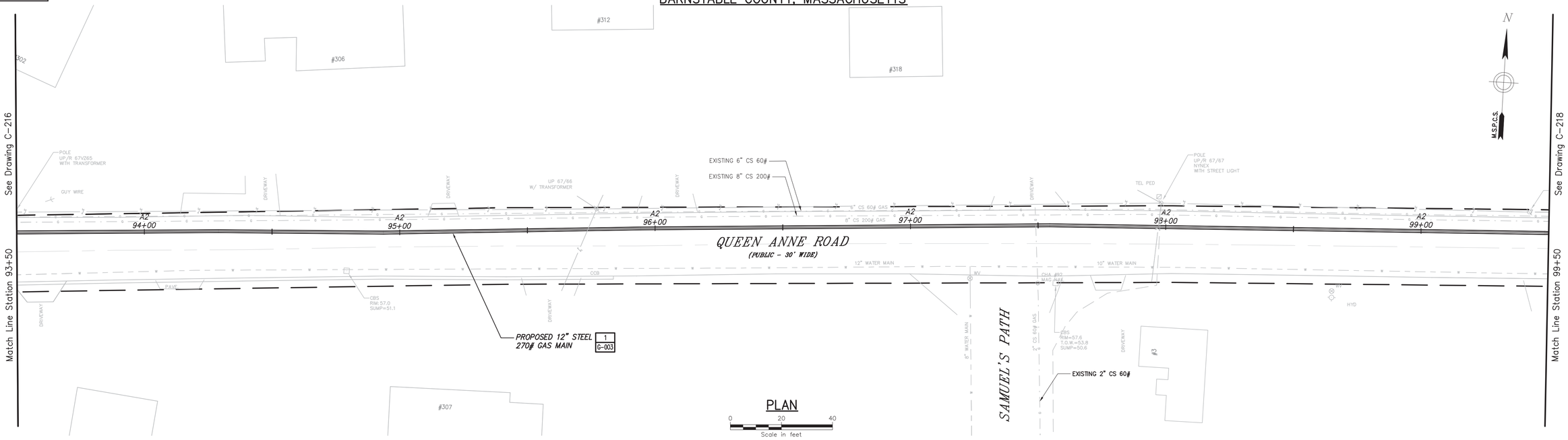
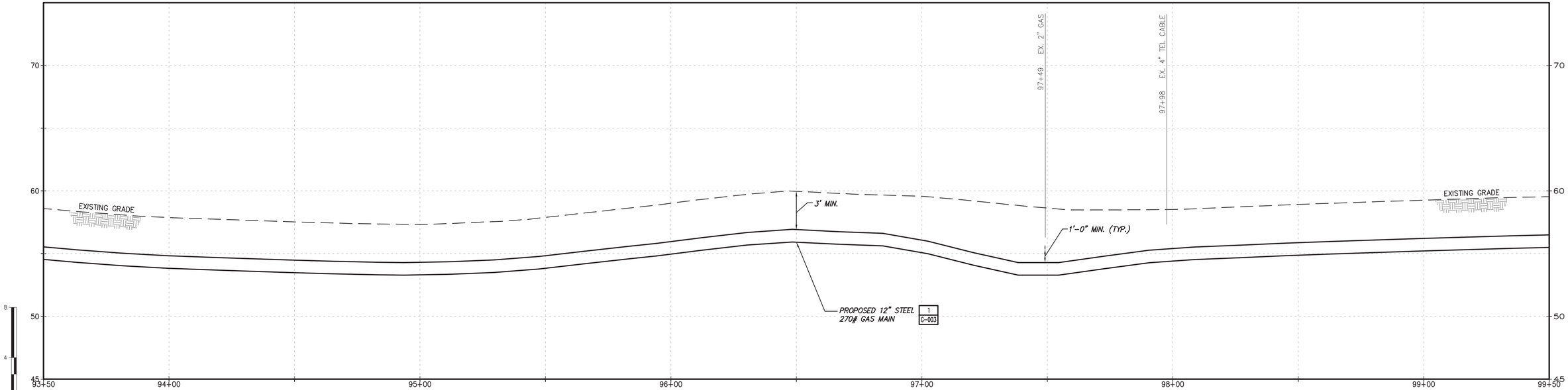
DRAWING NUMBER C-217

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-217-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-217-29847		C-217

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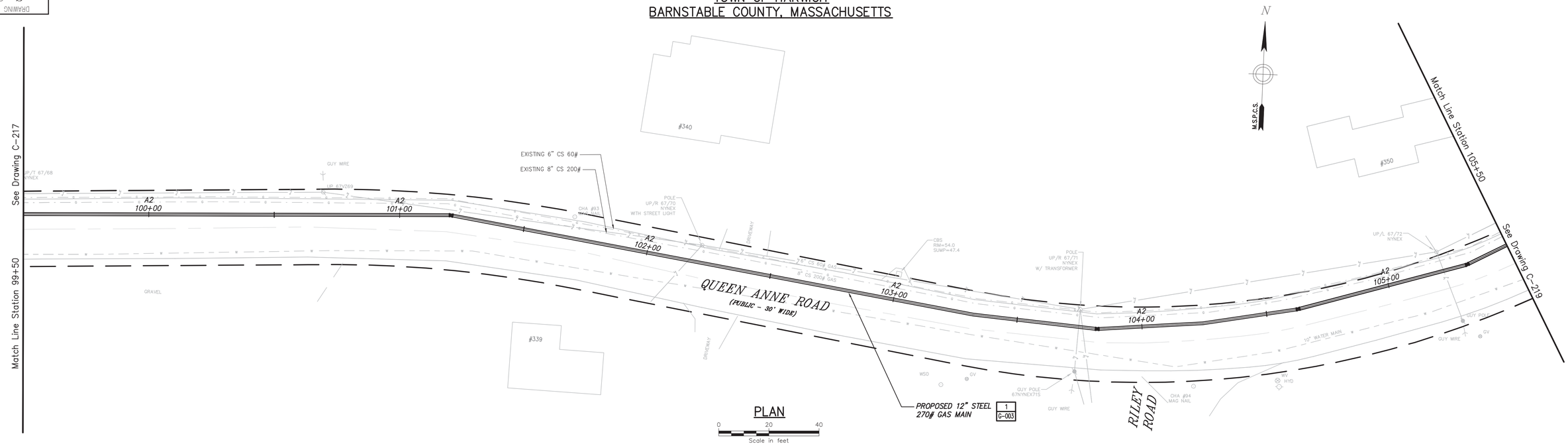
Saved: 1/14/2016 4:16:38 PM Plotted: 1/22/2016 2:18:13 PM

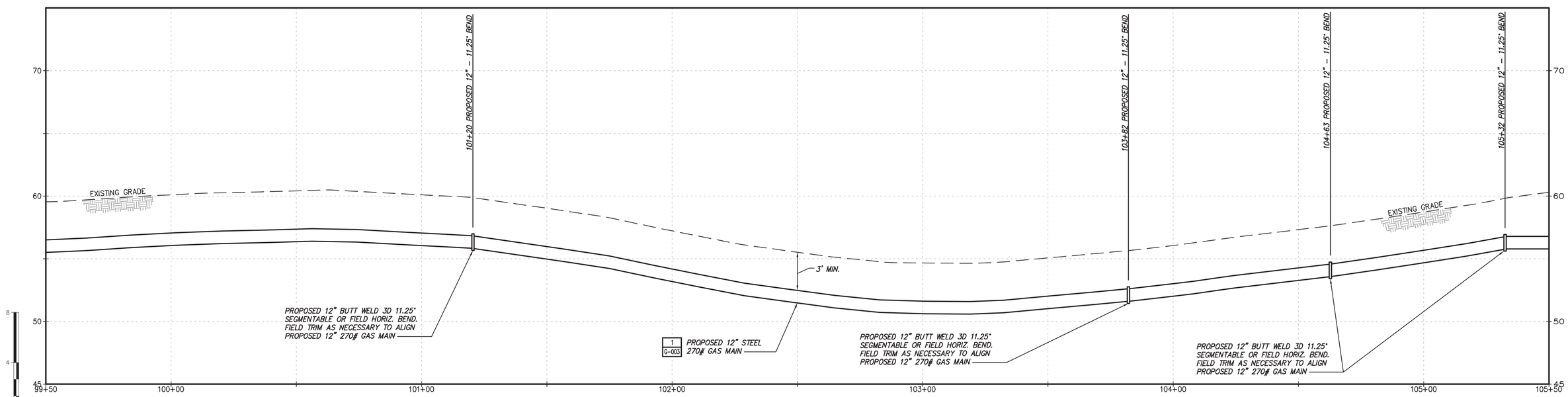
DRAWING NUMBER C-218

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-218-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-218-29847		C-218

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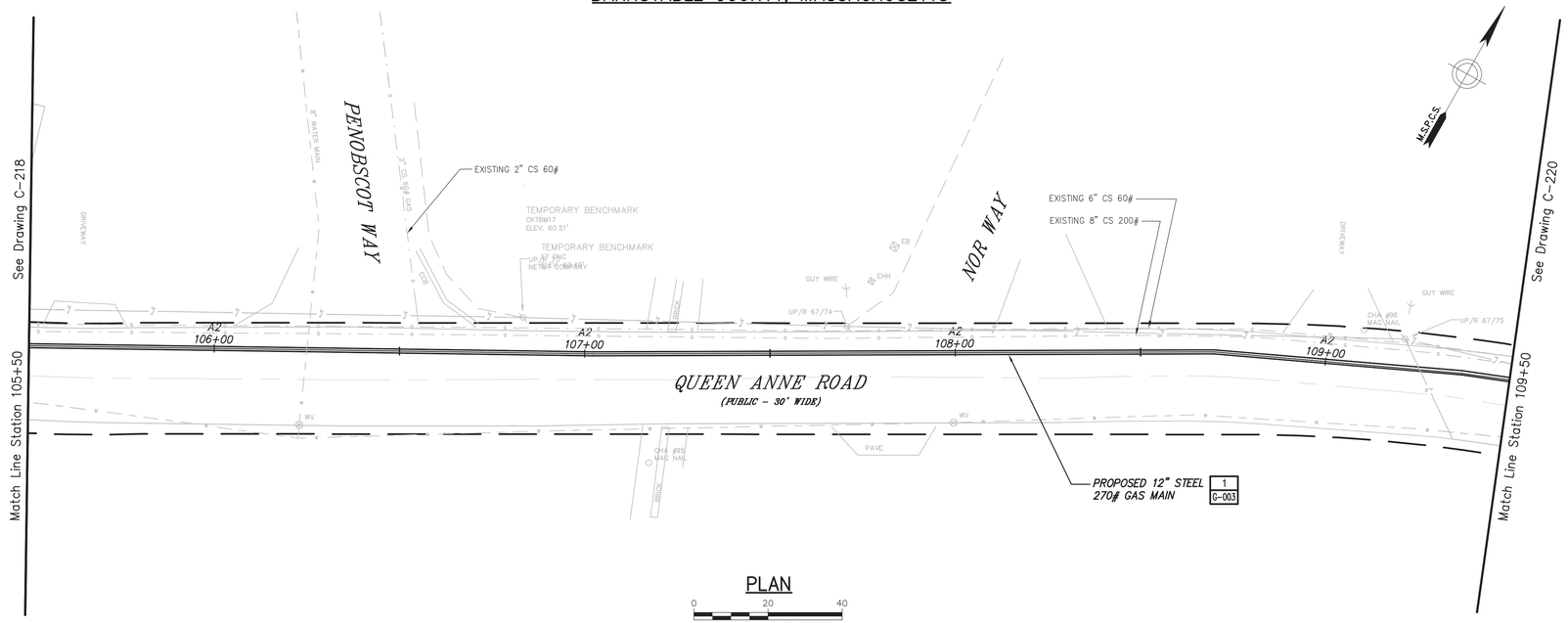
Saved: 1/18/2016 12:30:13 PM Plotted: 1/22/2016 2:19:29 PM

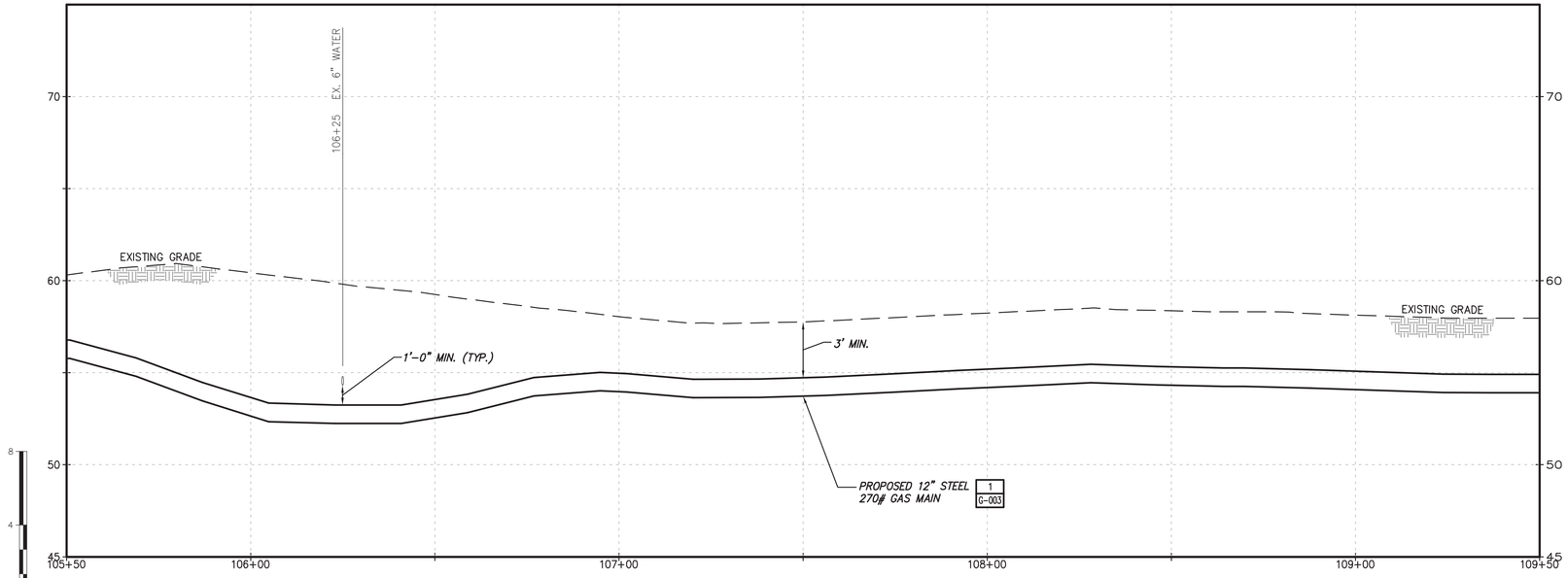
DRAWING NUMBER
C-219

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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CONSTRUCTION DRAWINGS

C-219-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-219-29847	SEQUENCE No.	DRAWING NUMBER C-219
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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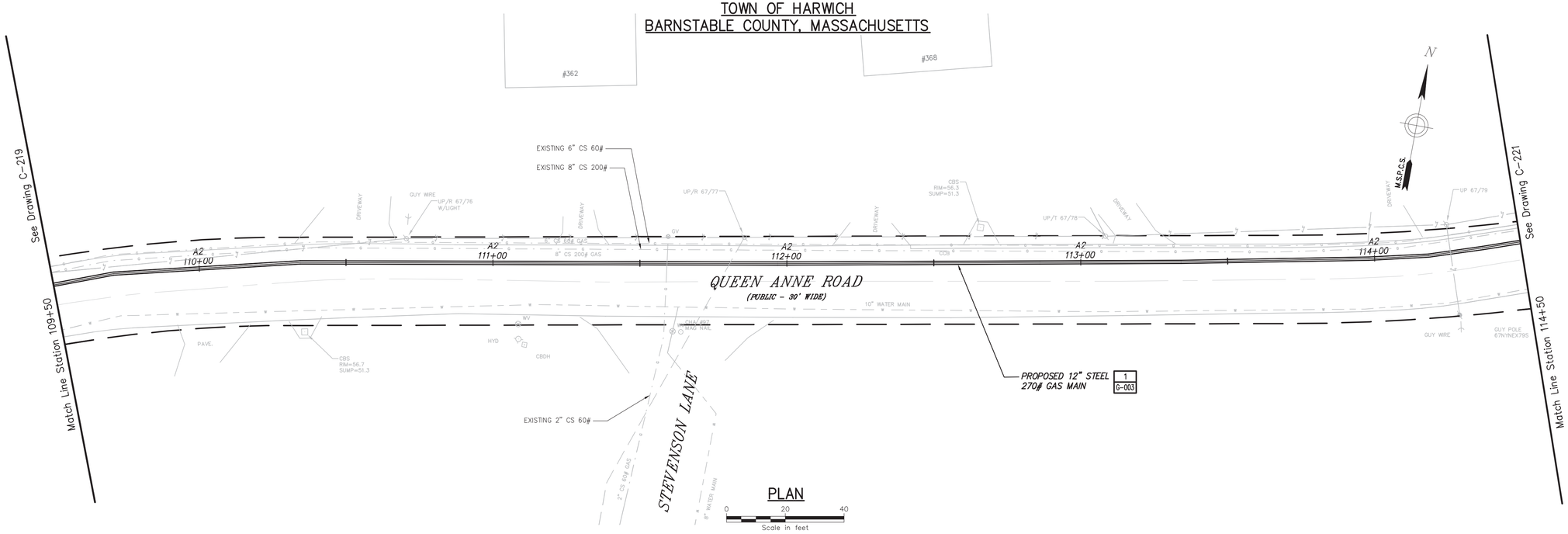
DRAWING NUMBER
C-220

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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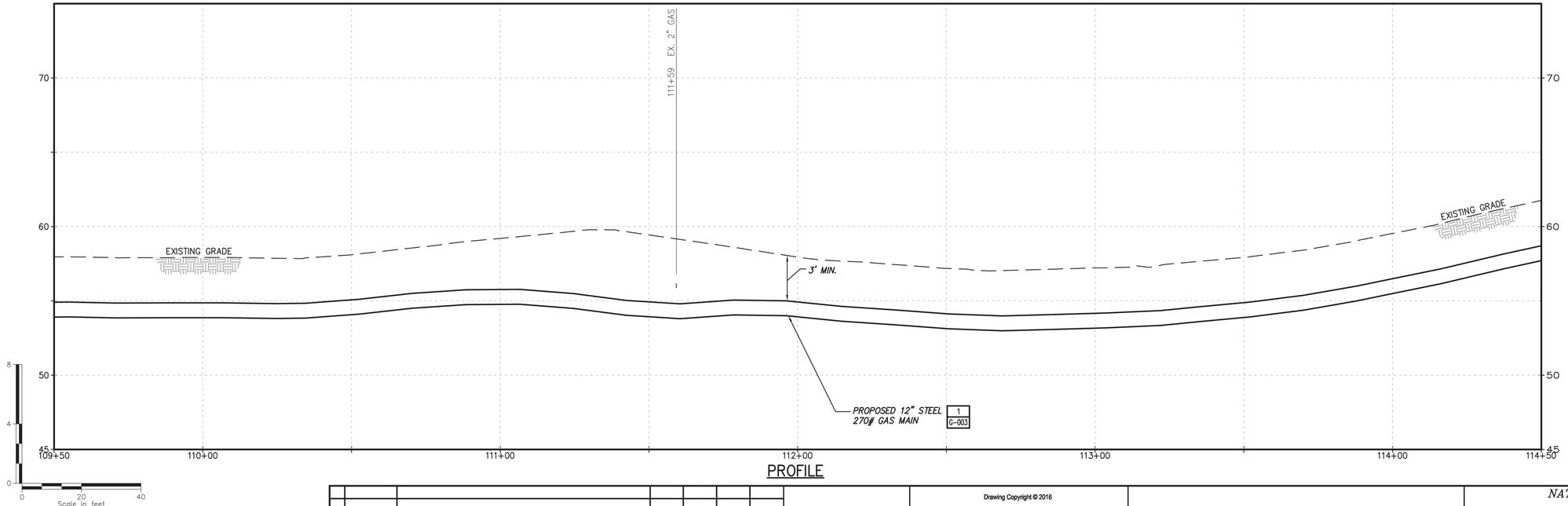

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C-220-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-220-29847	SEQUENCE No.	DRAWING NUMBER C-220
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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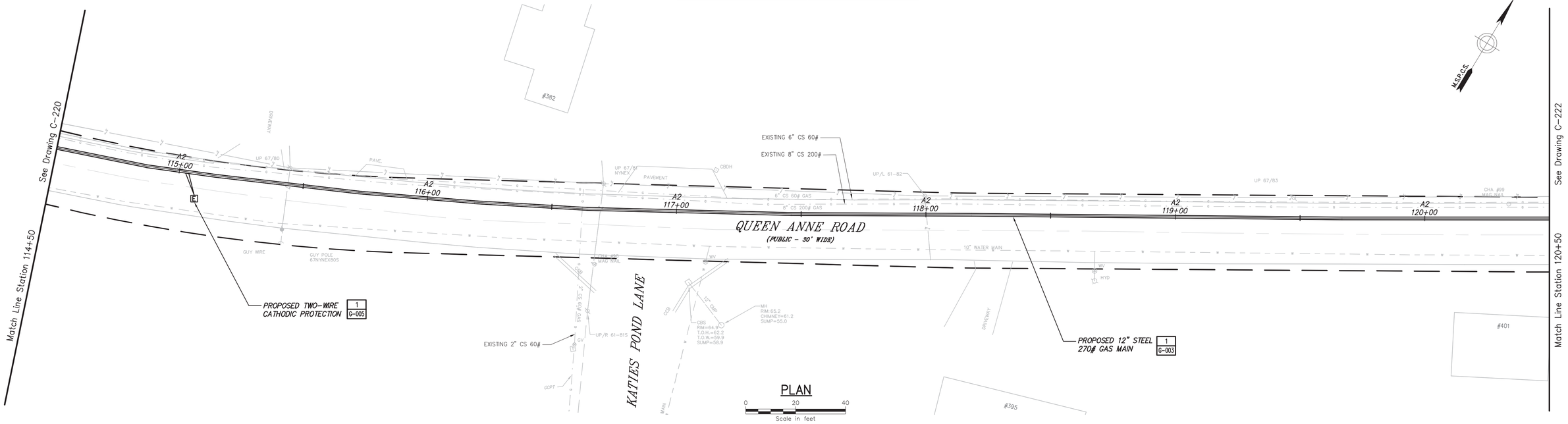
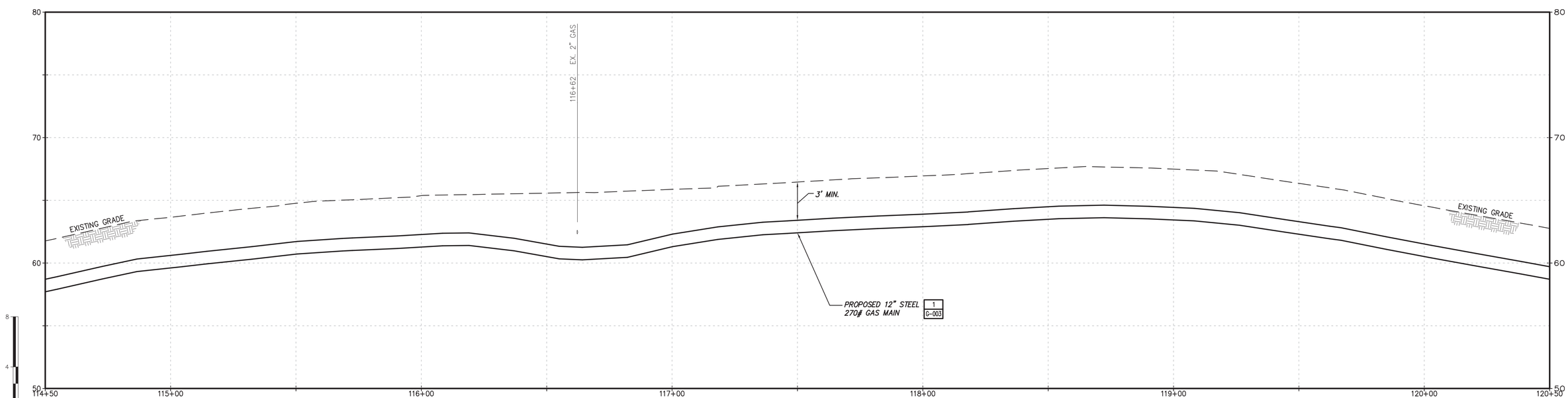
DRAWING NUMBER C-221

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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CONSTRUCTION DRAWINGS
C-221-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-221-29847	SEQUENCE No.	DRAWING NUMBER C-221
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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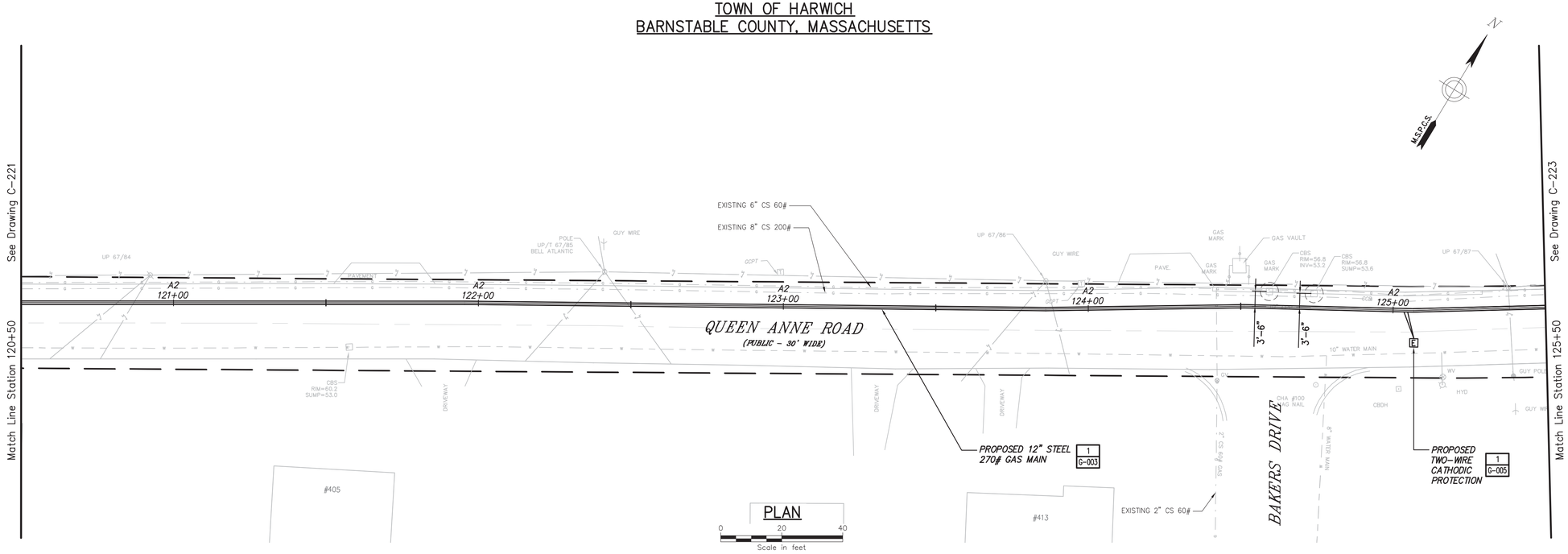
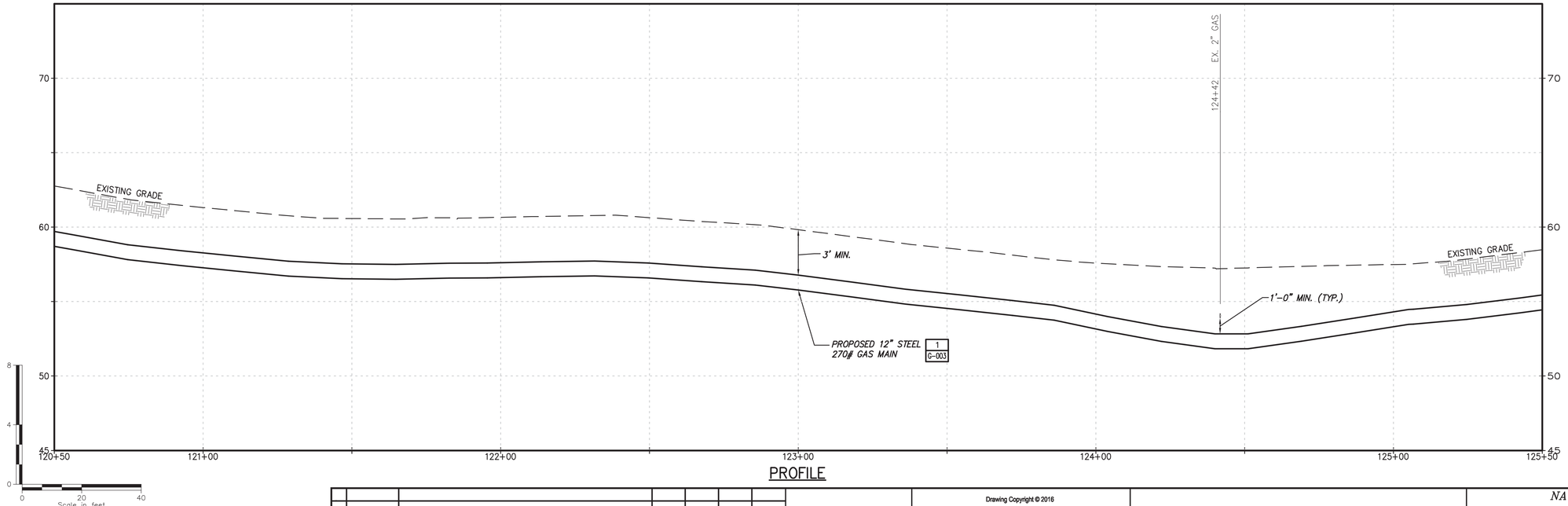
DRAWING NUMBER
C-222

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-222-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-222-29847		C-222

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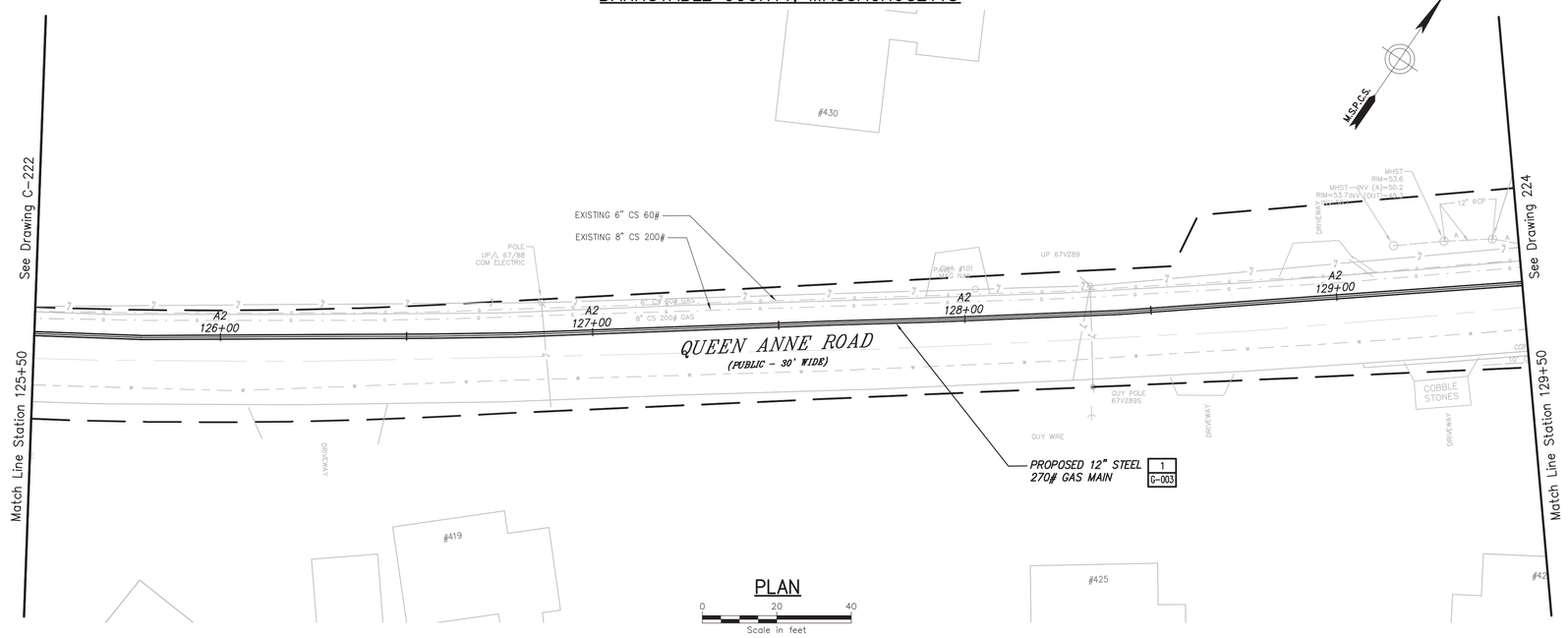
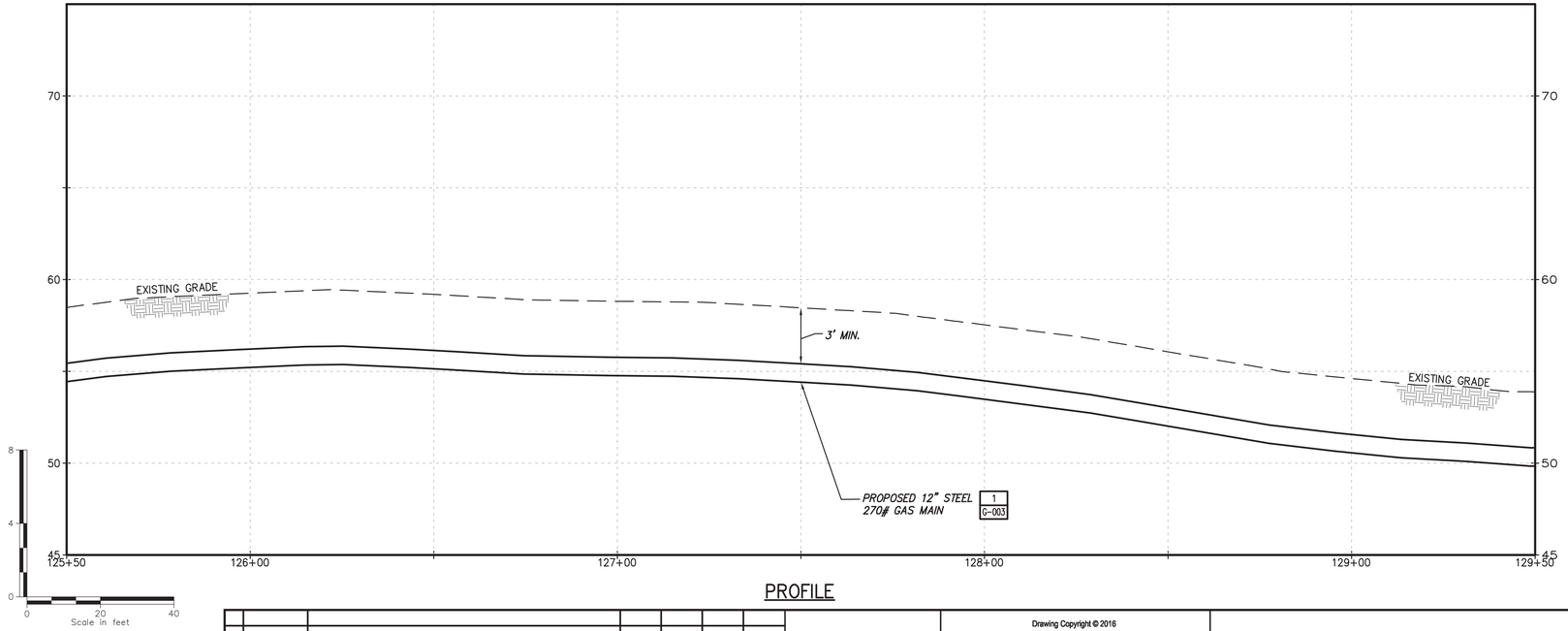
DRAWING NUMBER
C-223

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-223-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-223-29847		C-223

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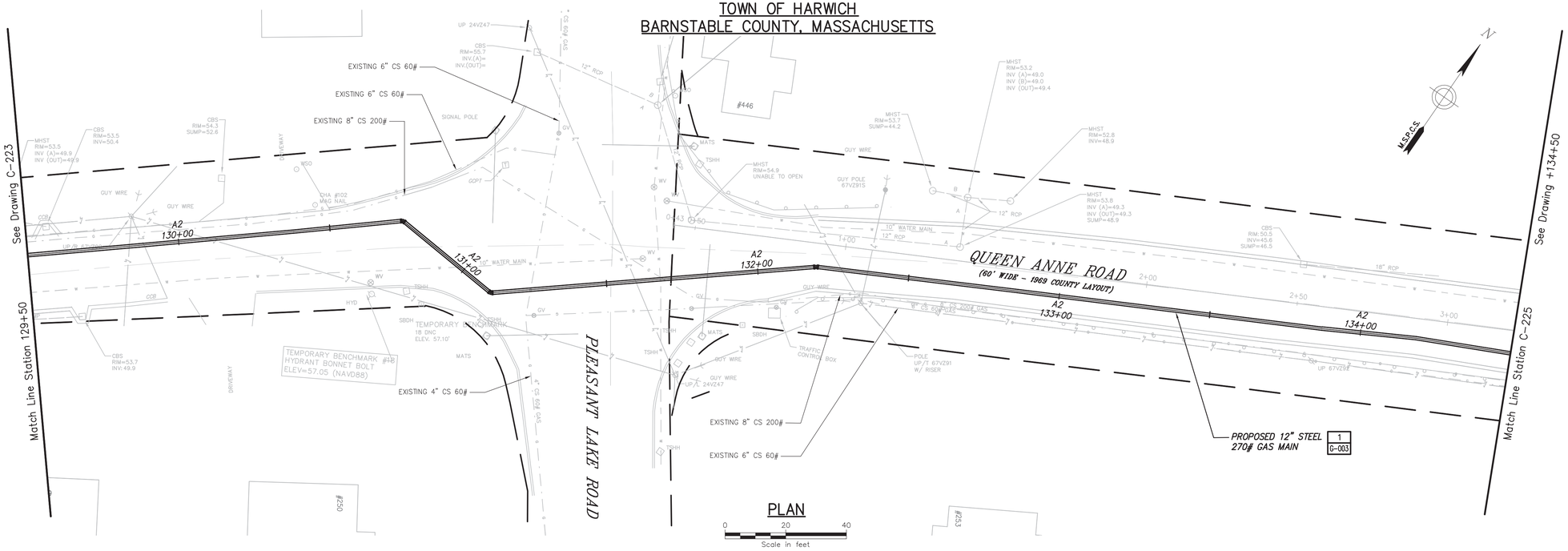
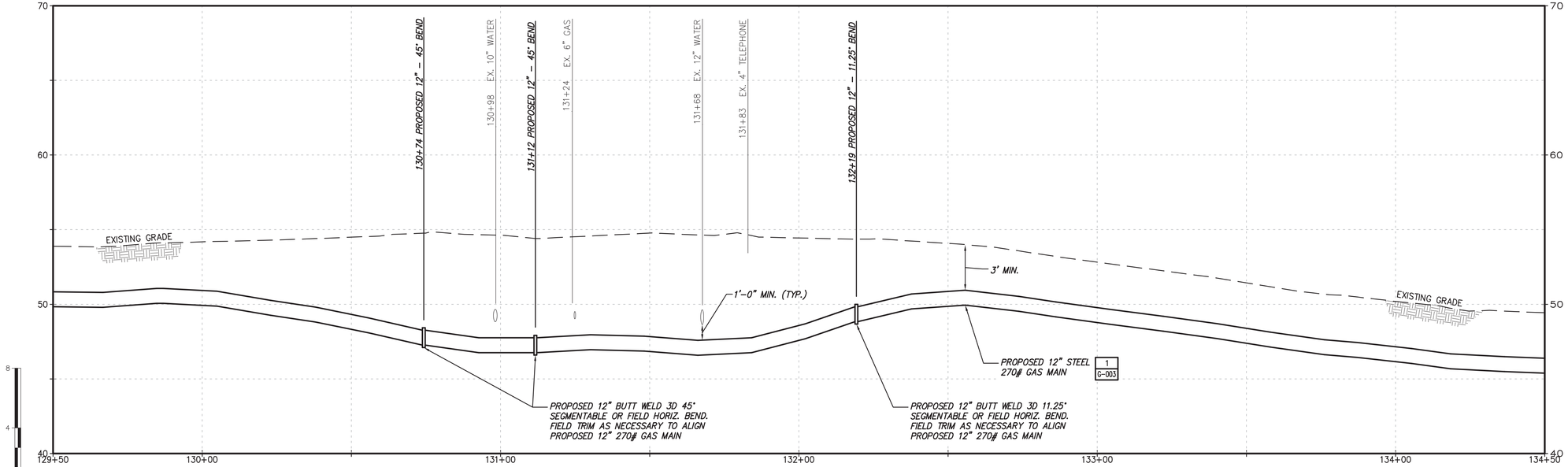
DRAWING NUMBER
C-224

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-224-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-224-29847		C-224

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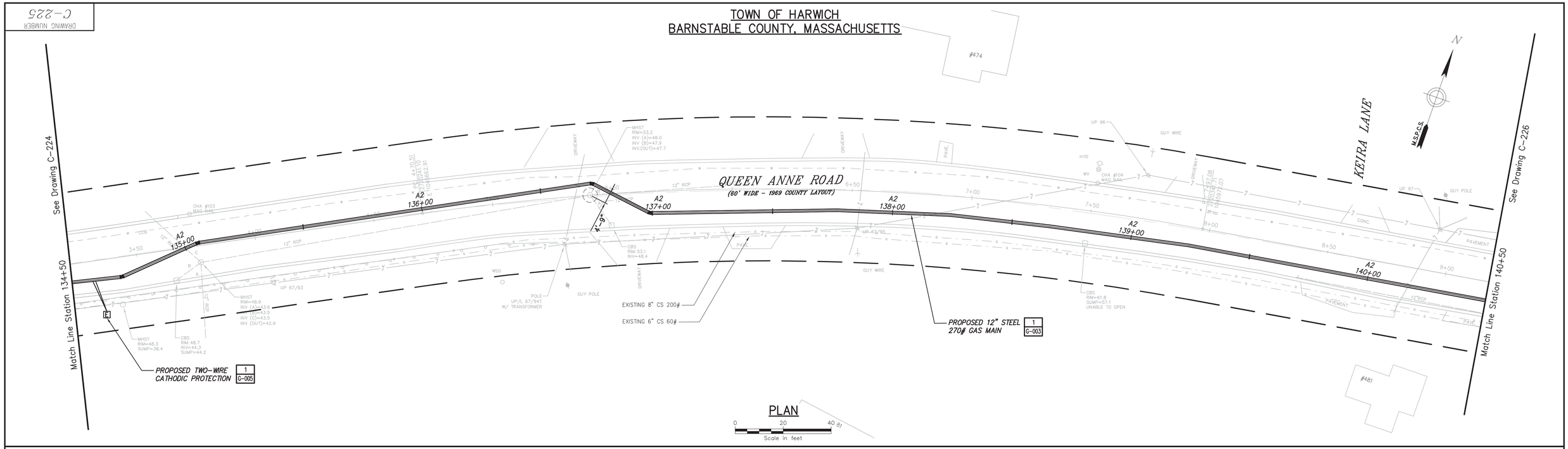
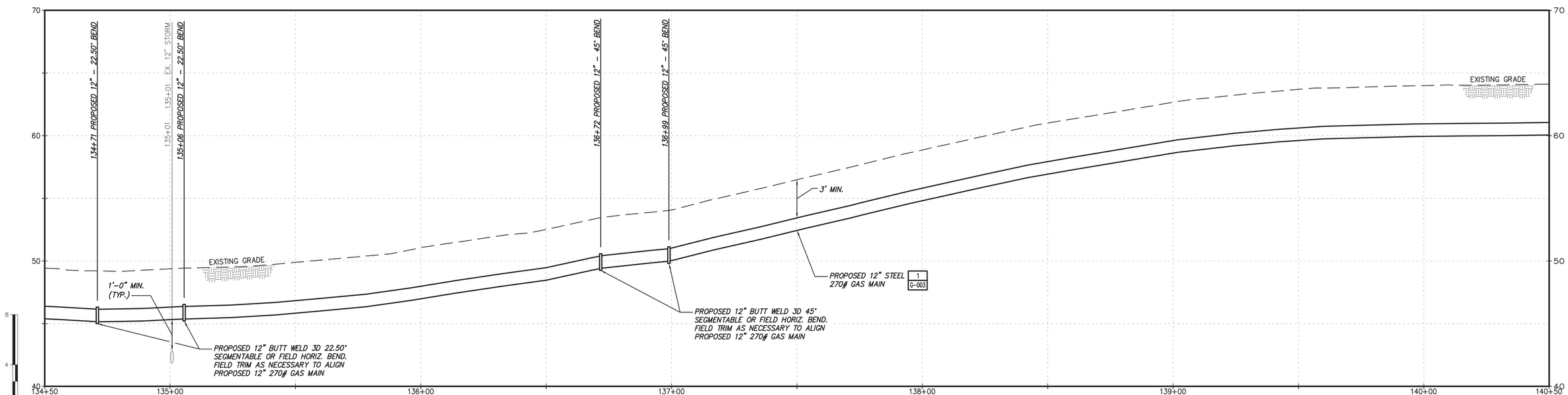
DRAWING NUMBER C-225

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40 ft
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-225-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-225-29847		C-225

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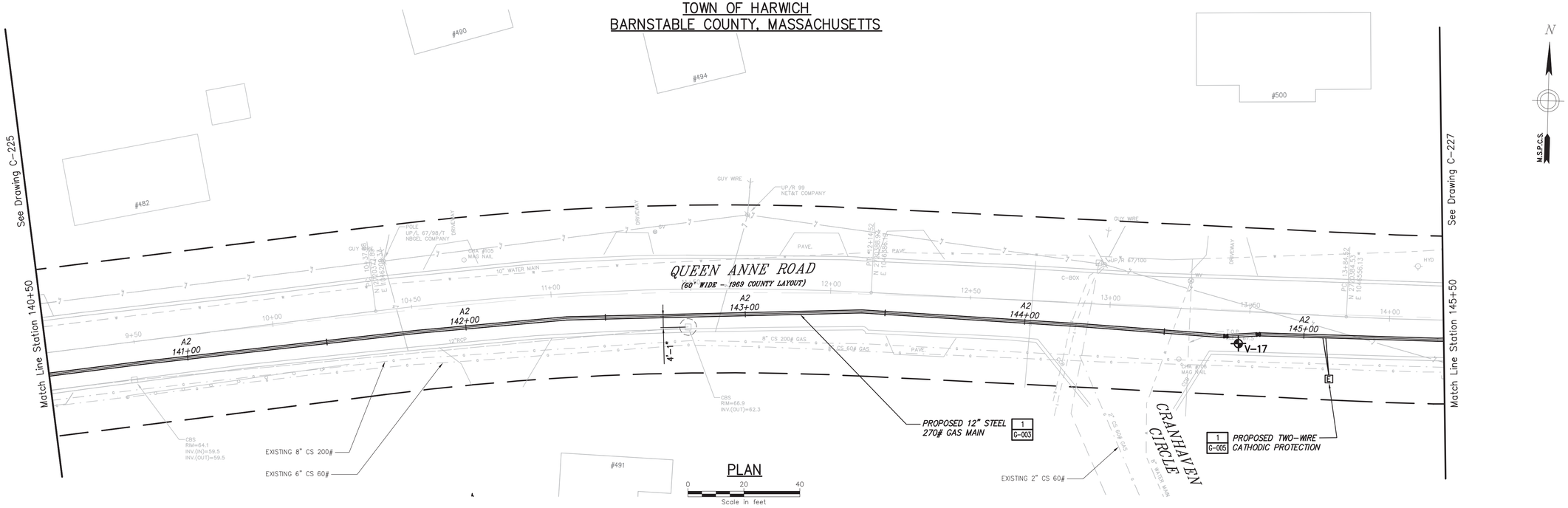
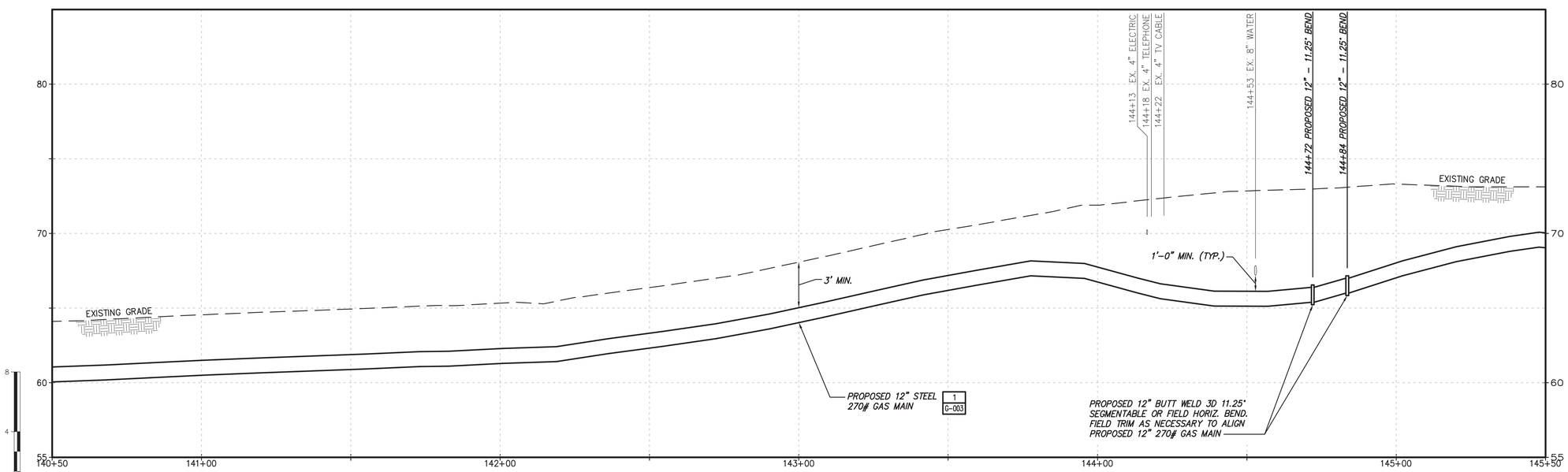
DRAWING NUMBER C-226

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



PROFILE

Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-226-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-226-29847		C-226

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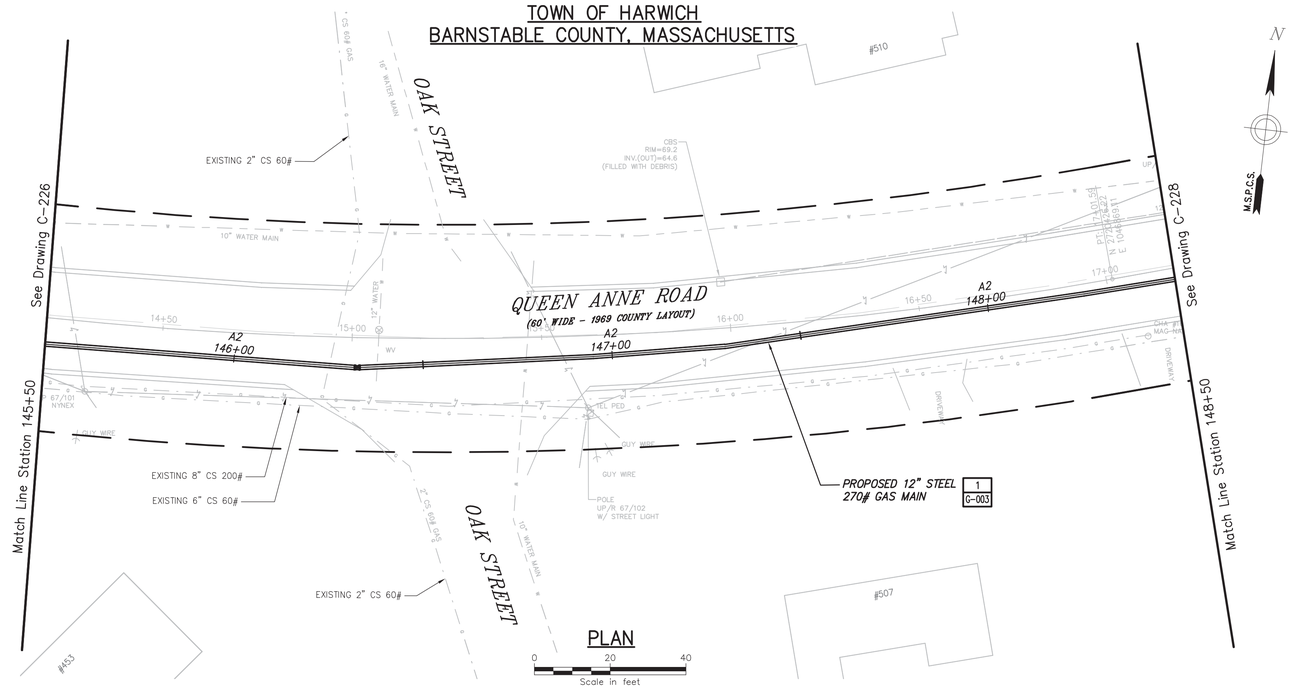
DRAWING NUMBER
C-227

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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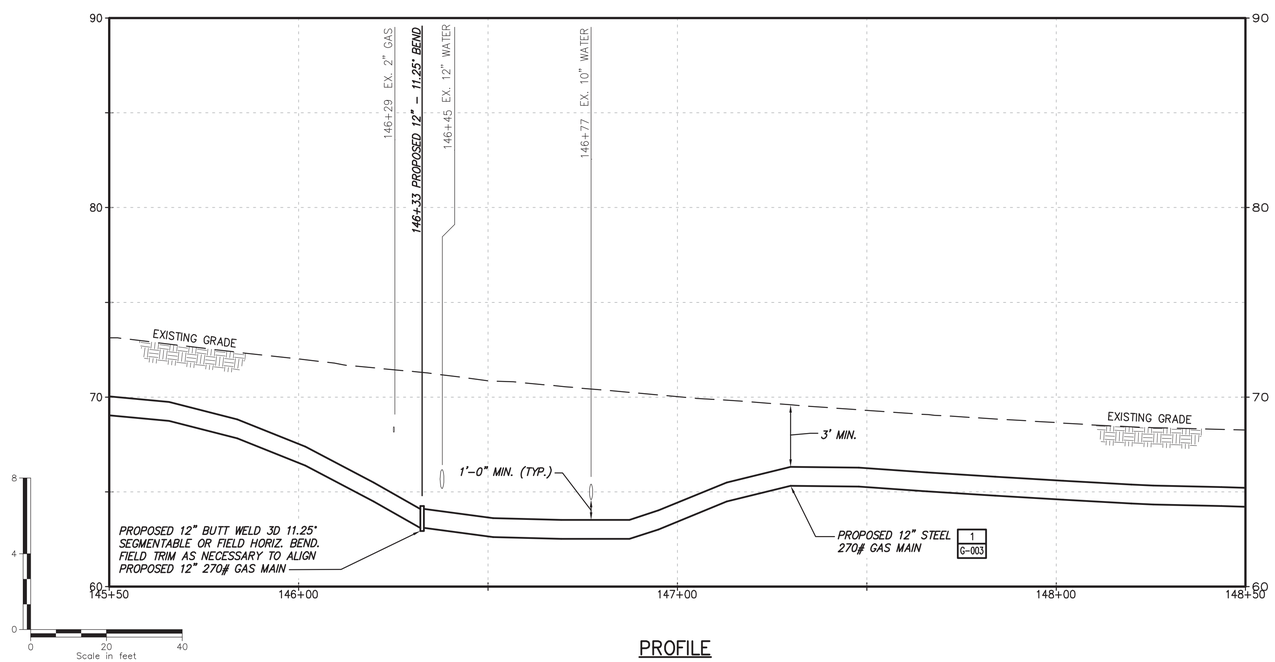

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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
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CONSTRUCTION DRAWINGS
C-227-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-227-29847	SEQUENCE No.	DRAWING NUMBER C-227
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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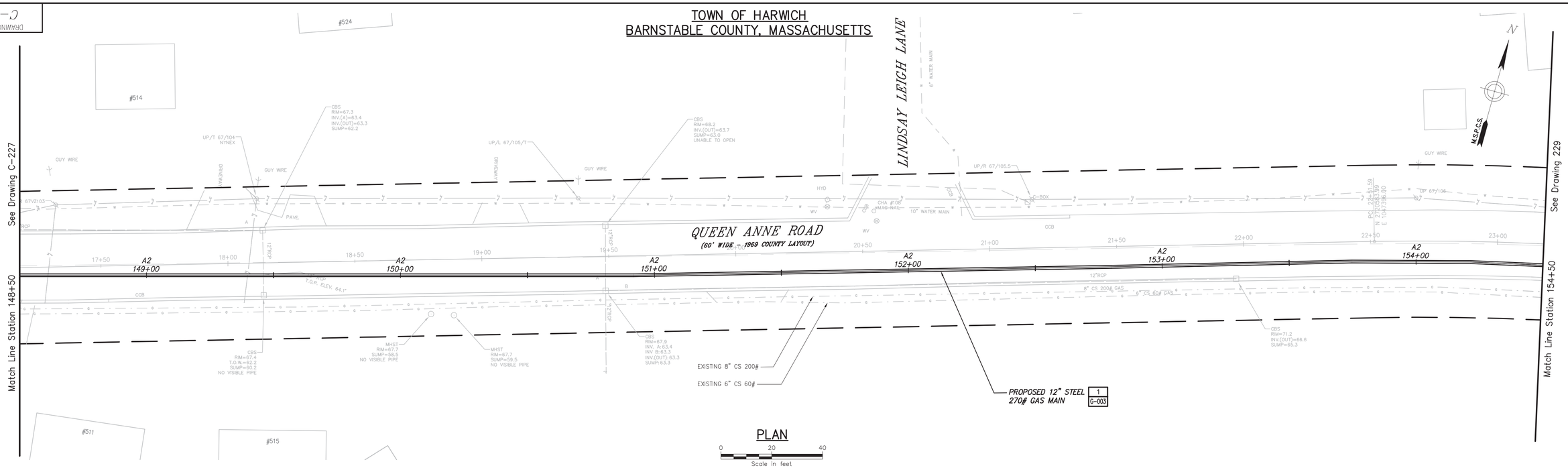
DRAWING NUMBER C-228

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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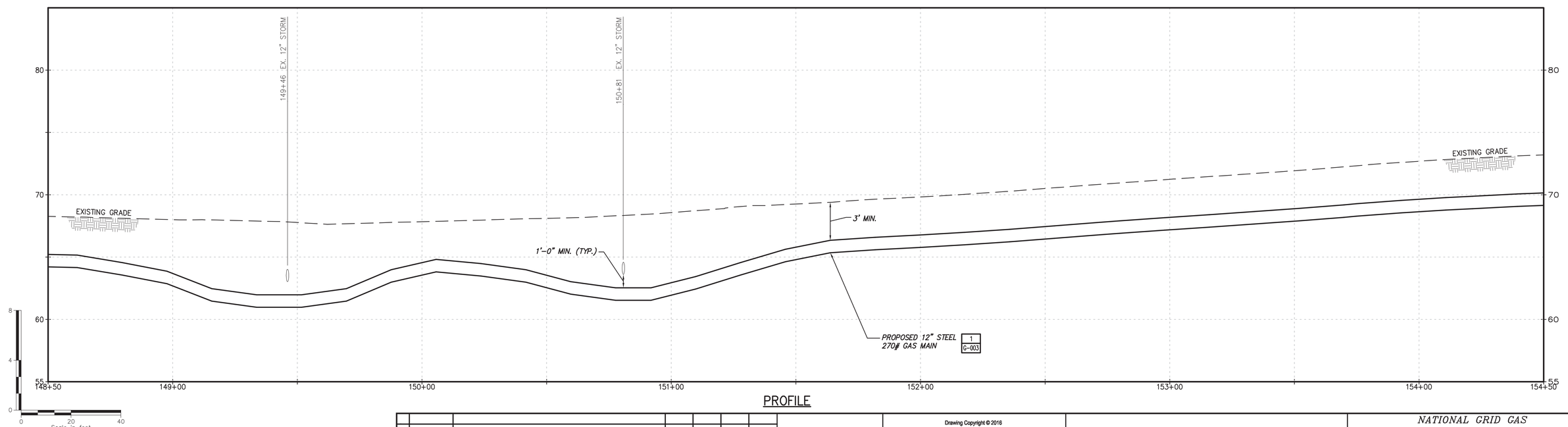

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No.	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-228-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-228-29847		C-228

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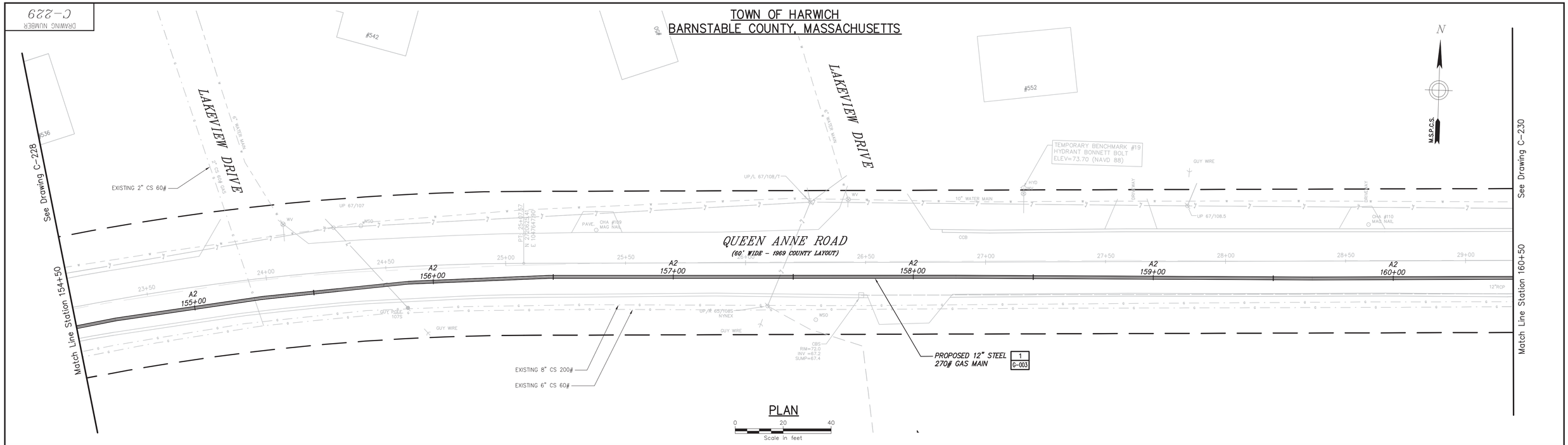
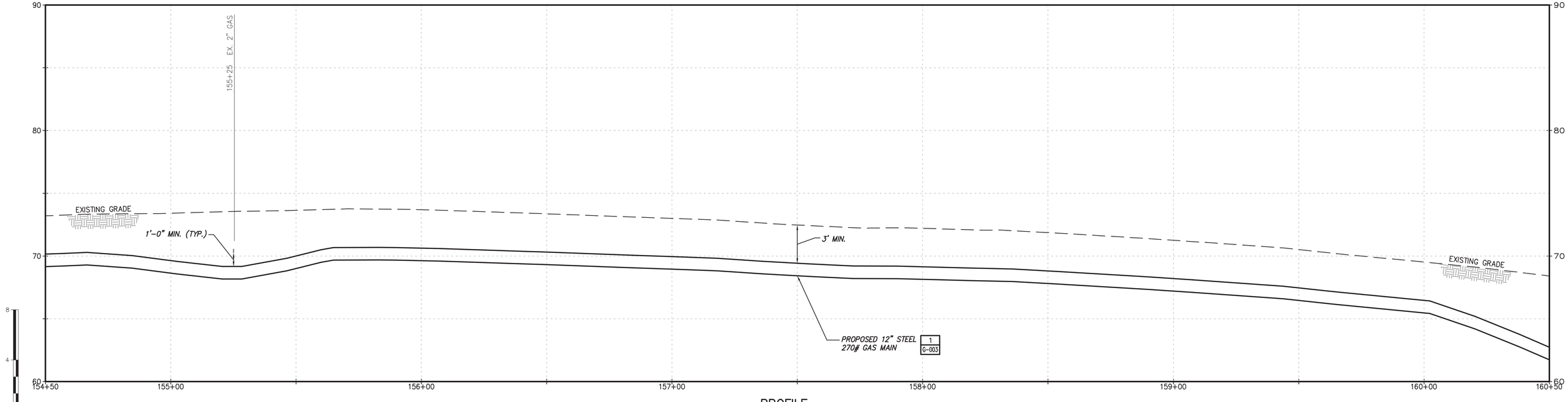
DRAWING NUMBER C-229

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

Scale in feet



PROFILE

Scale in feet

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NATIONAL GRID GAS
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CONSTRUCTION DRAWINGS
C-229-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-229-29847	SEQUENCE No.	DRAWING NUMBER C-229
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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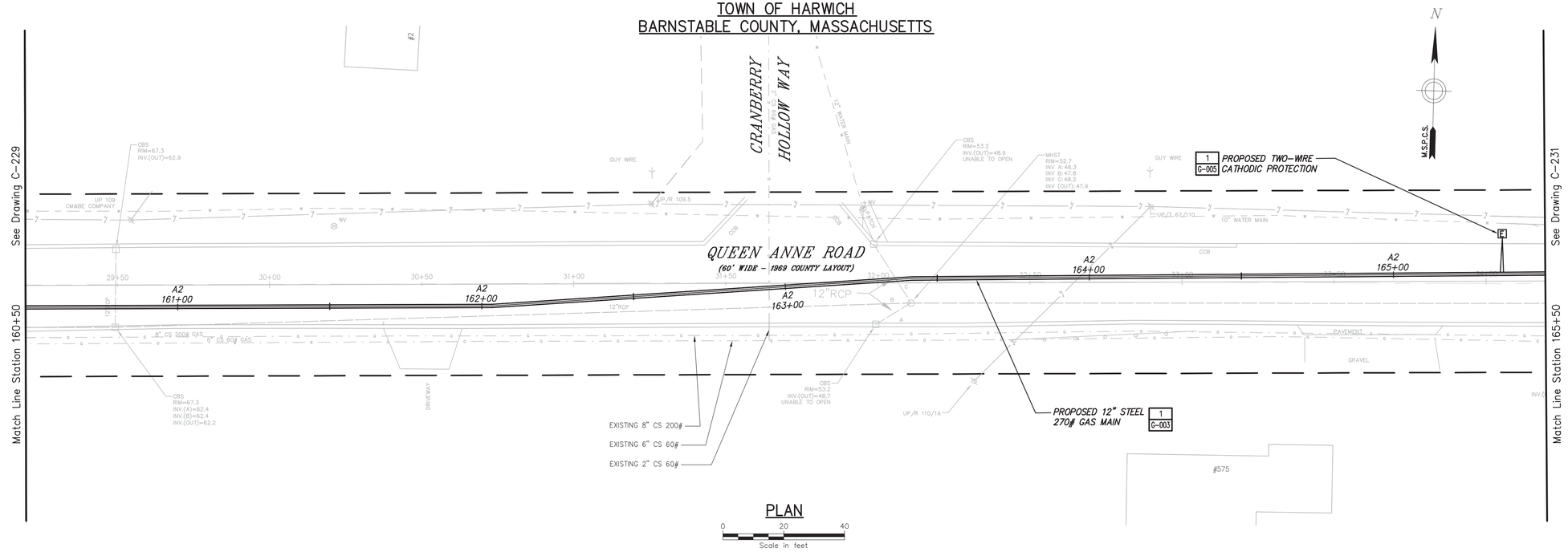
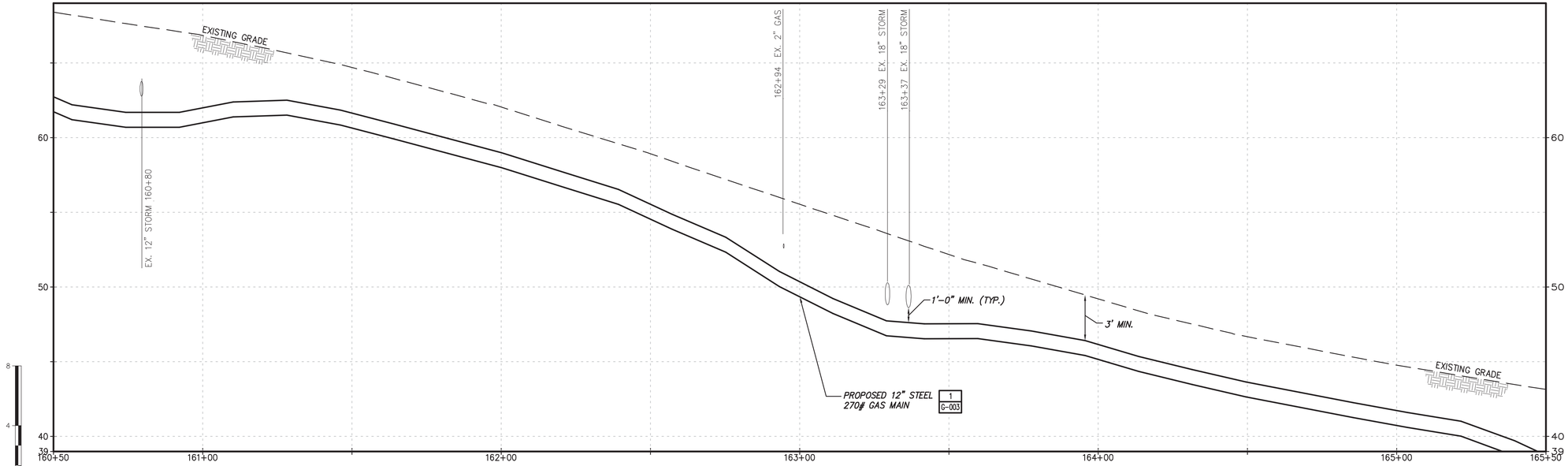
DRAWING NUMBER C-230

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-230-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-230-29847		C-230

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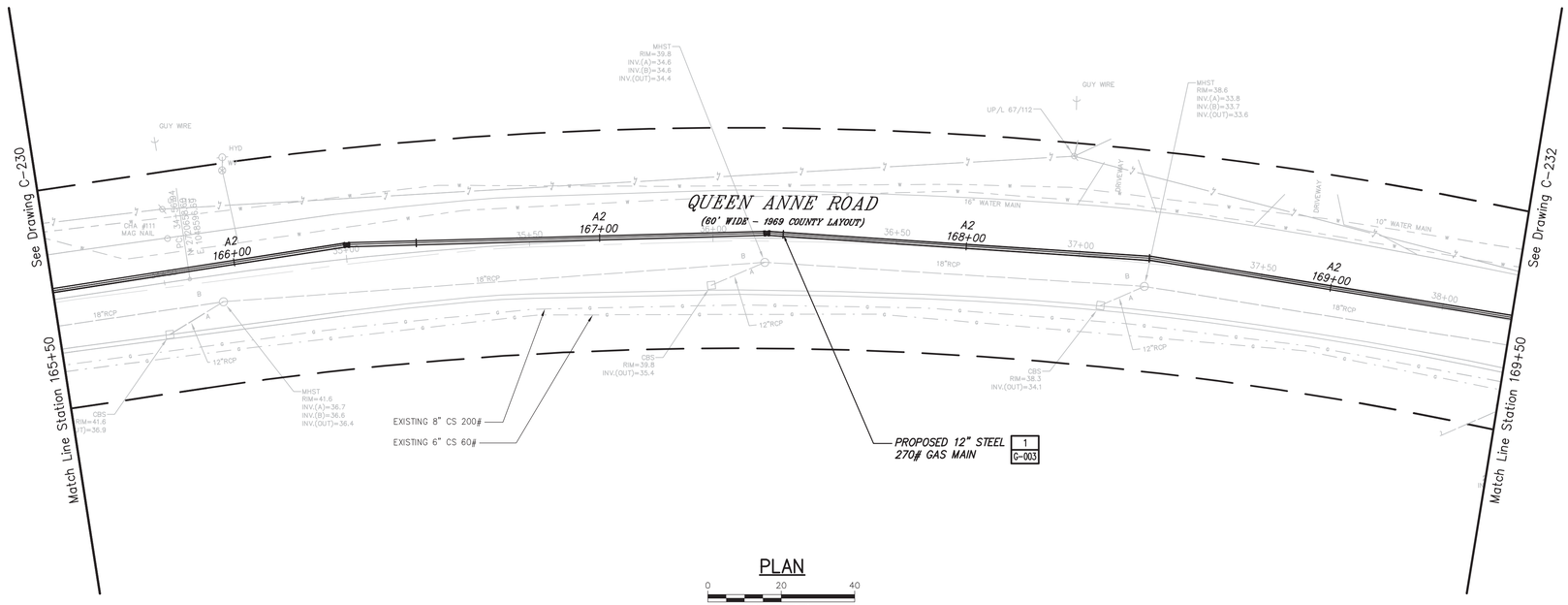
DRAWING NUMBER
C-231

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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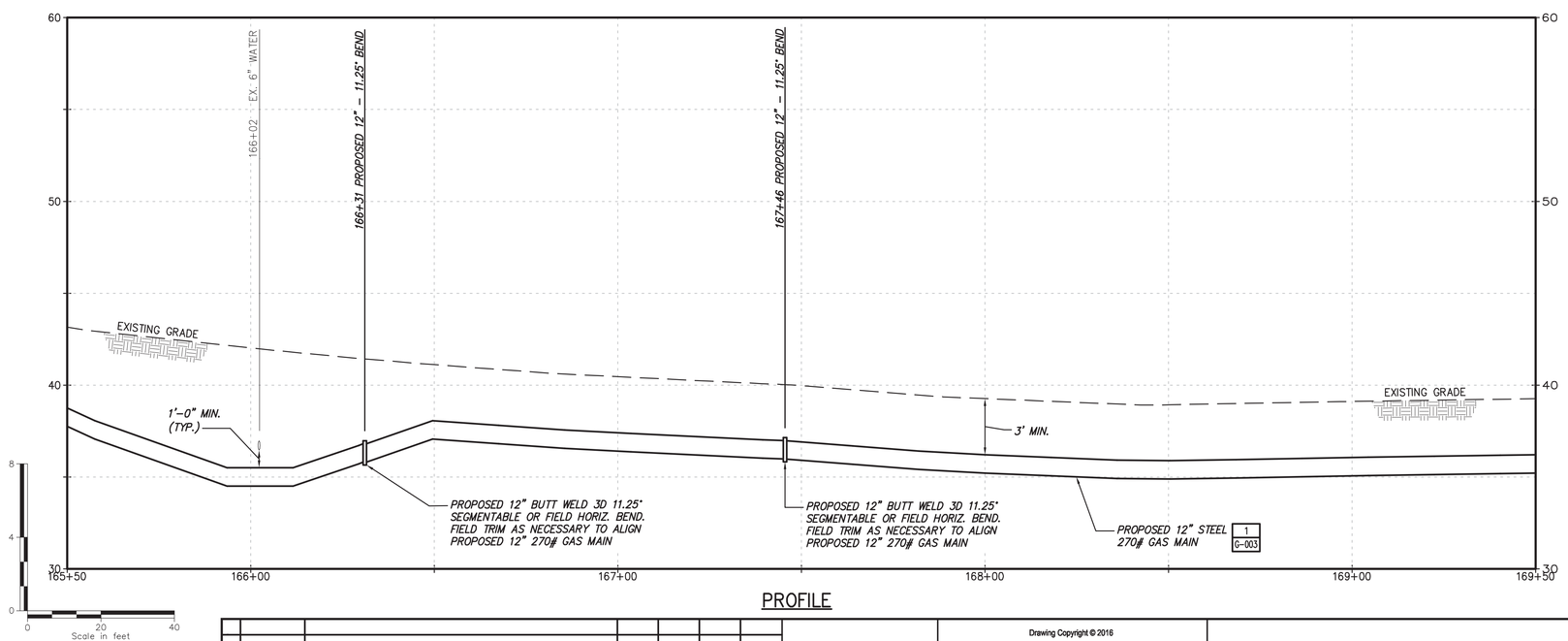
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-231-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-231-29847		C-231

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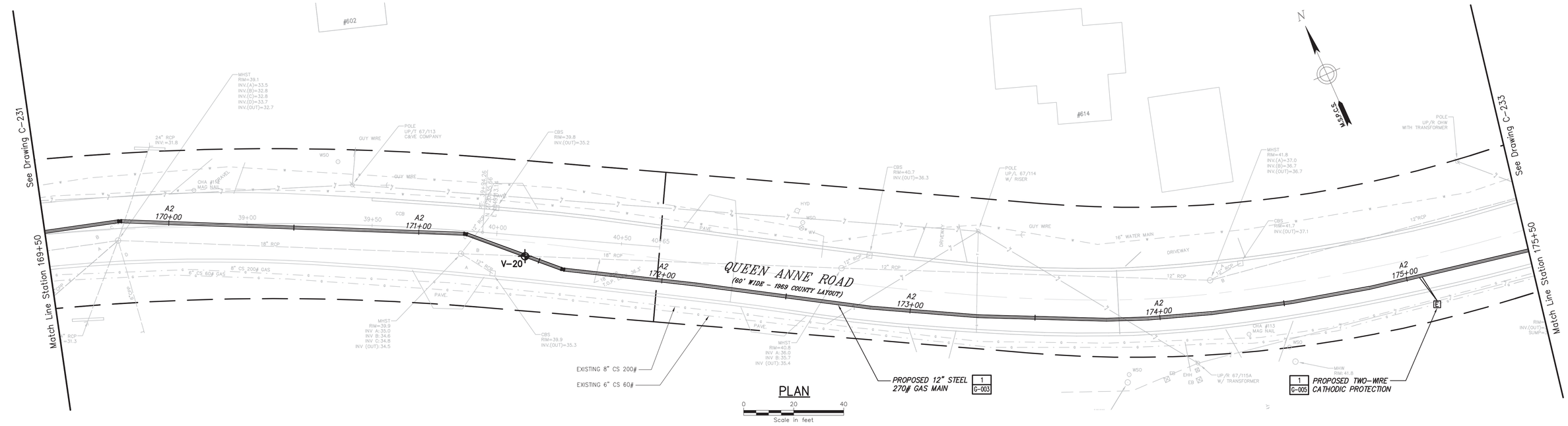
DRAWING NUMBER C-232

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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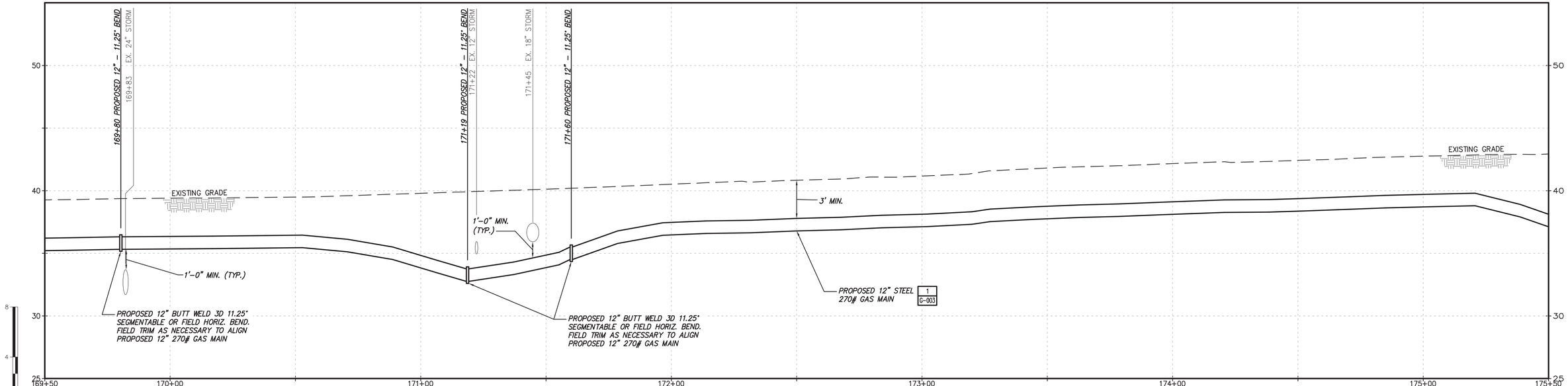
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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Chkd. BCK	Design Engr. CEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-232-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-232-29847		C-232

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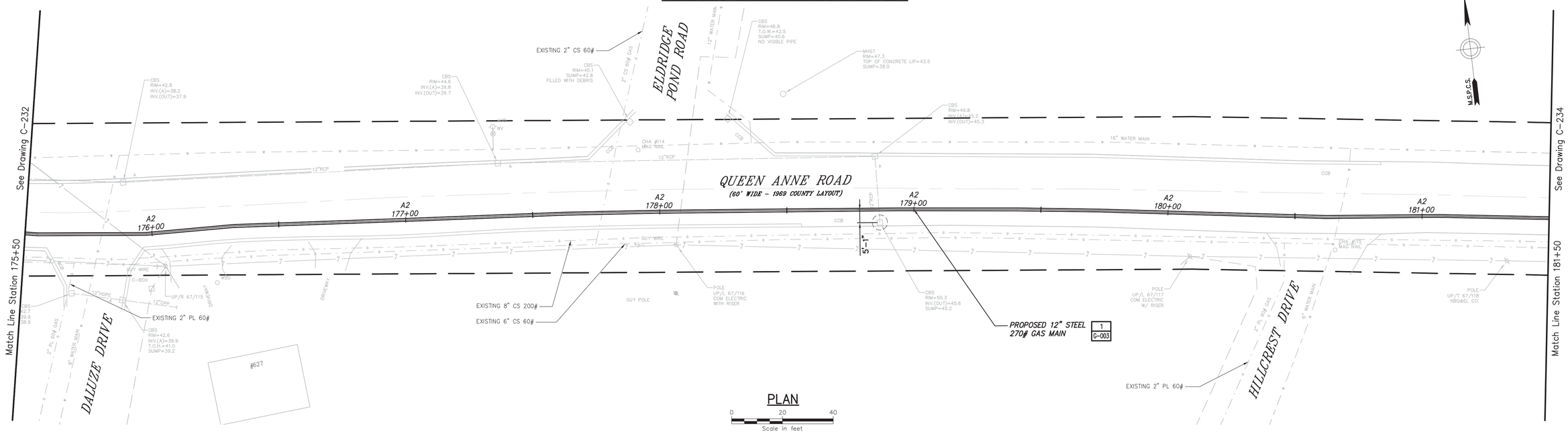
DRAWING NUMBER C-233

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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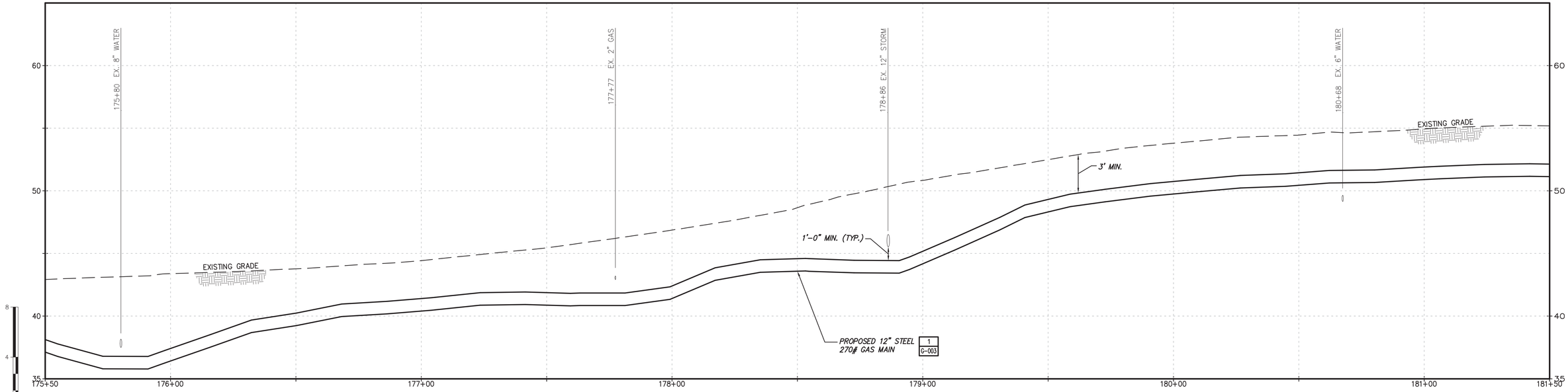
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-233-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-233-29847		C-233

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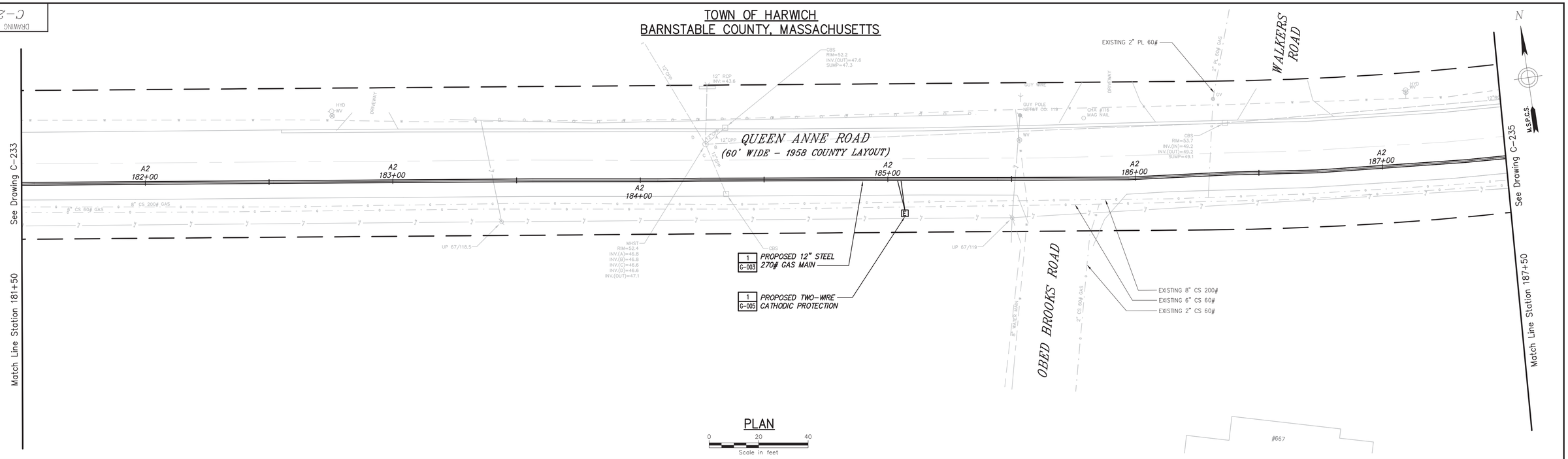
DRAWING NUMBER C-234

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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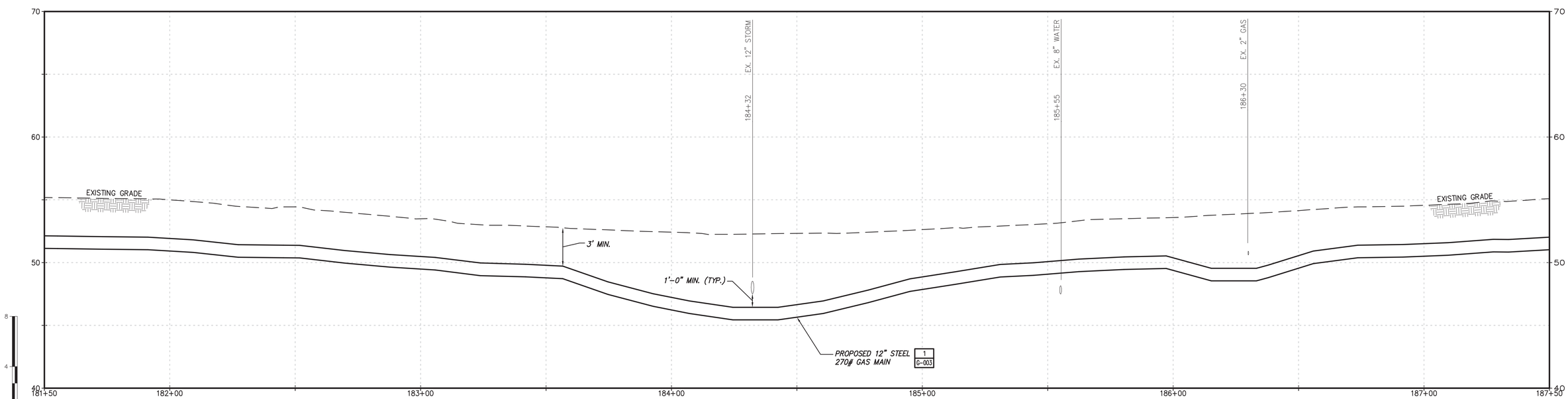
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-234-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-234-29847		C-234

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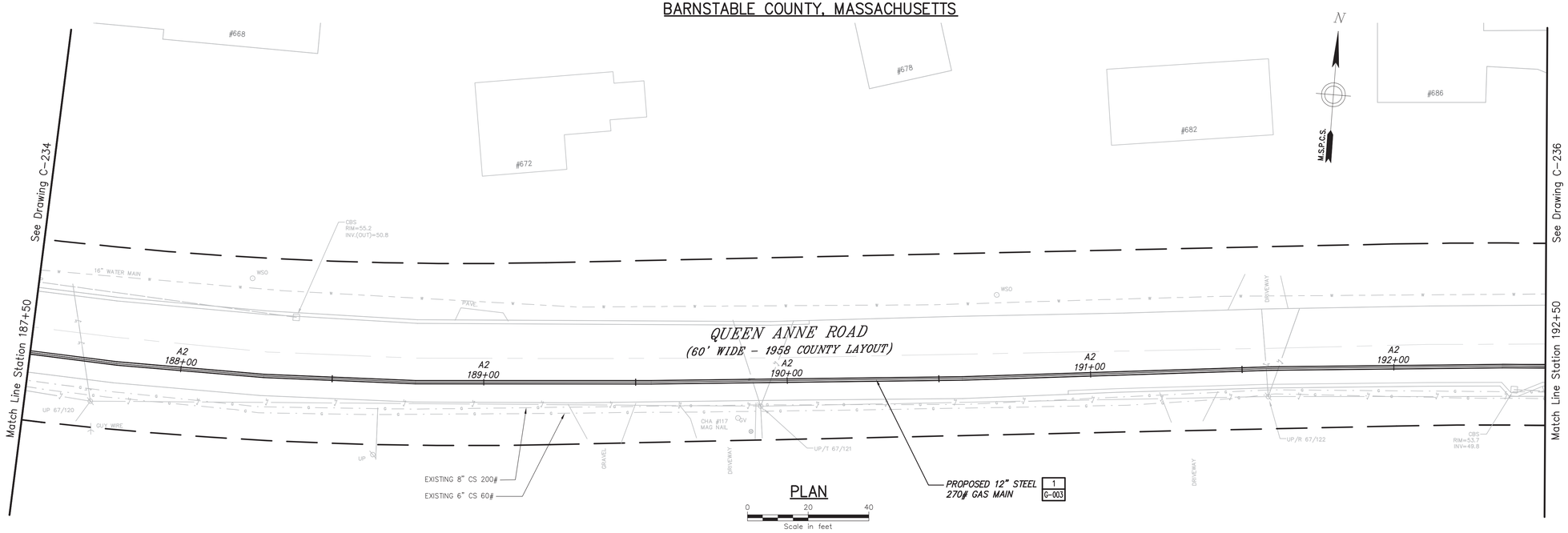
DRAWING NUMBER
C-235

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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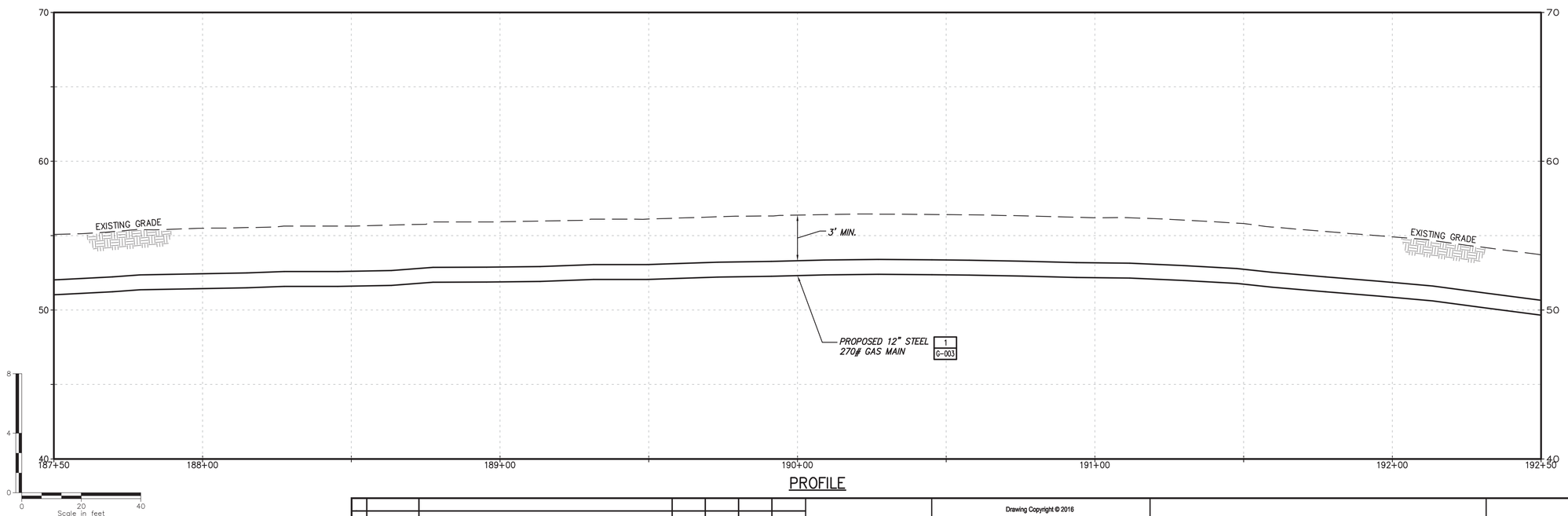

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-235-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-235-29847		C-235

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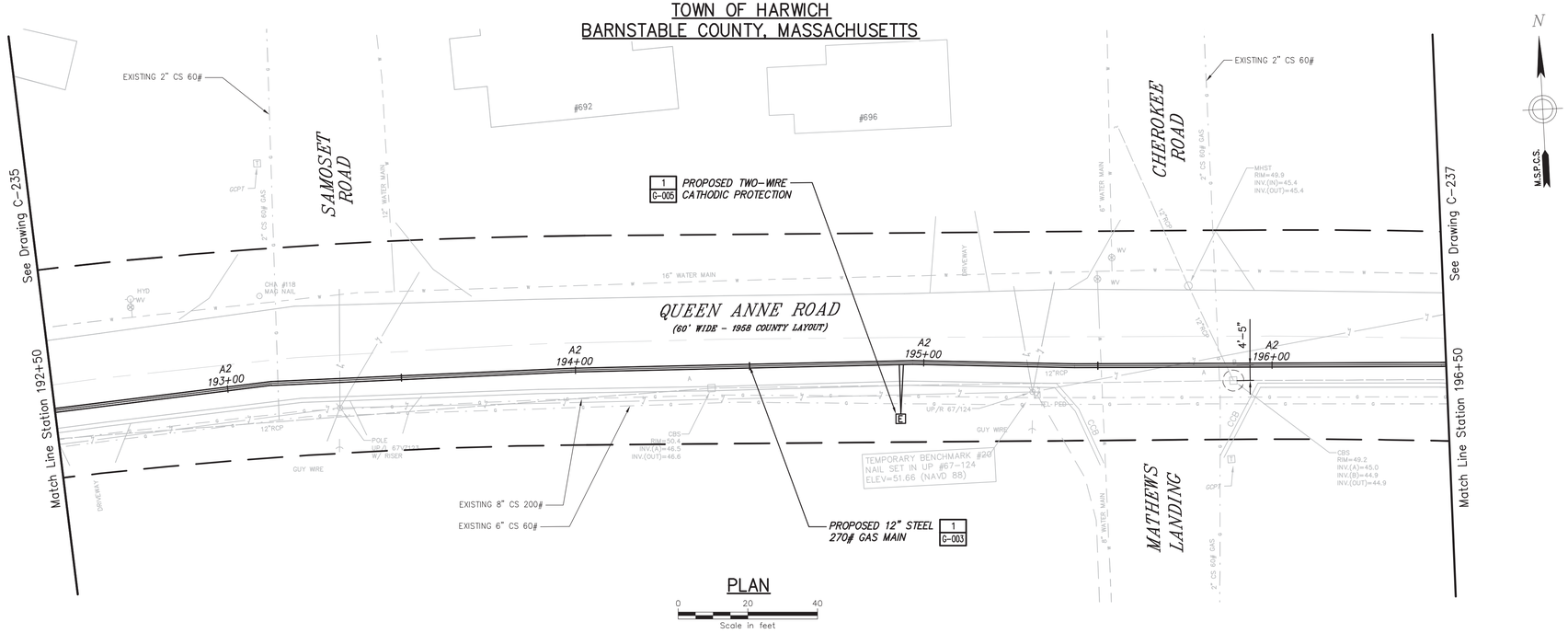
DRAWING NUMBER C-236

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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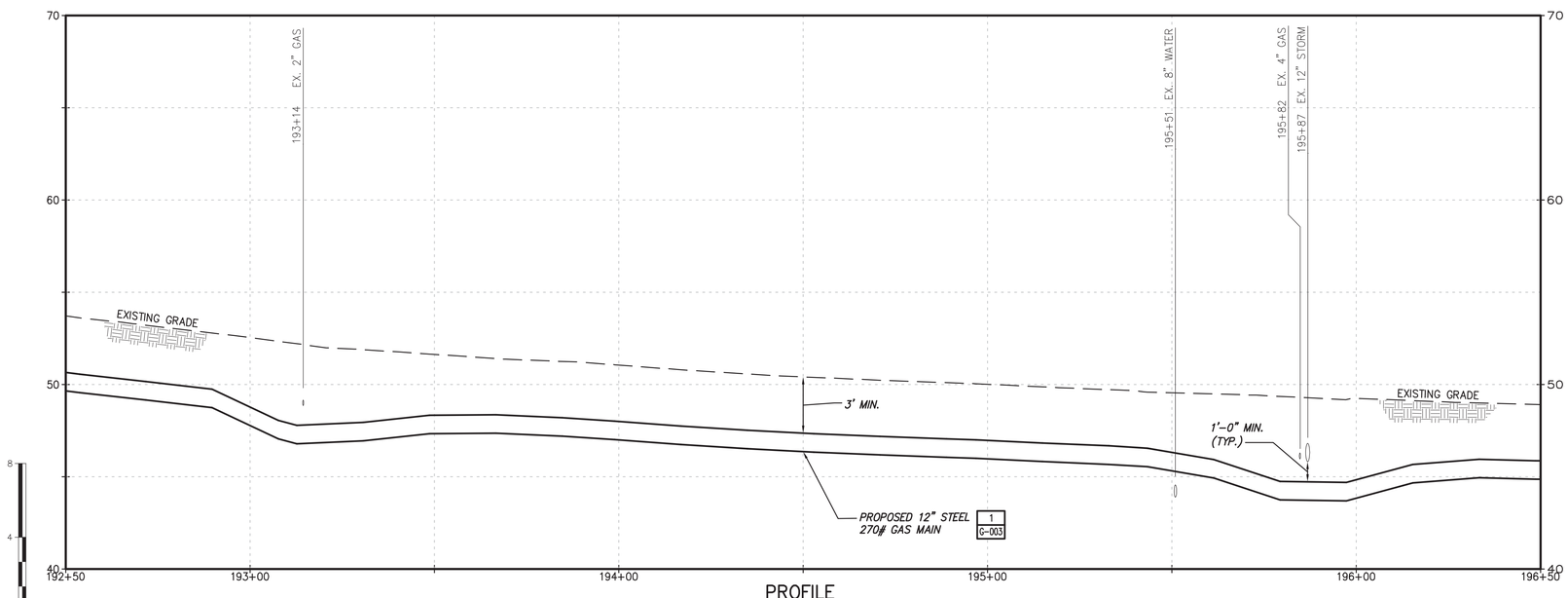

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-236-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-236-29847		C-236

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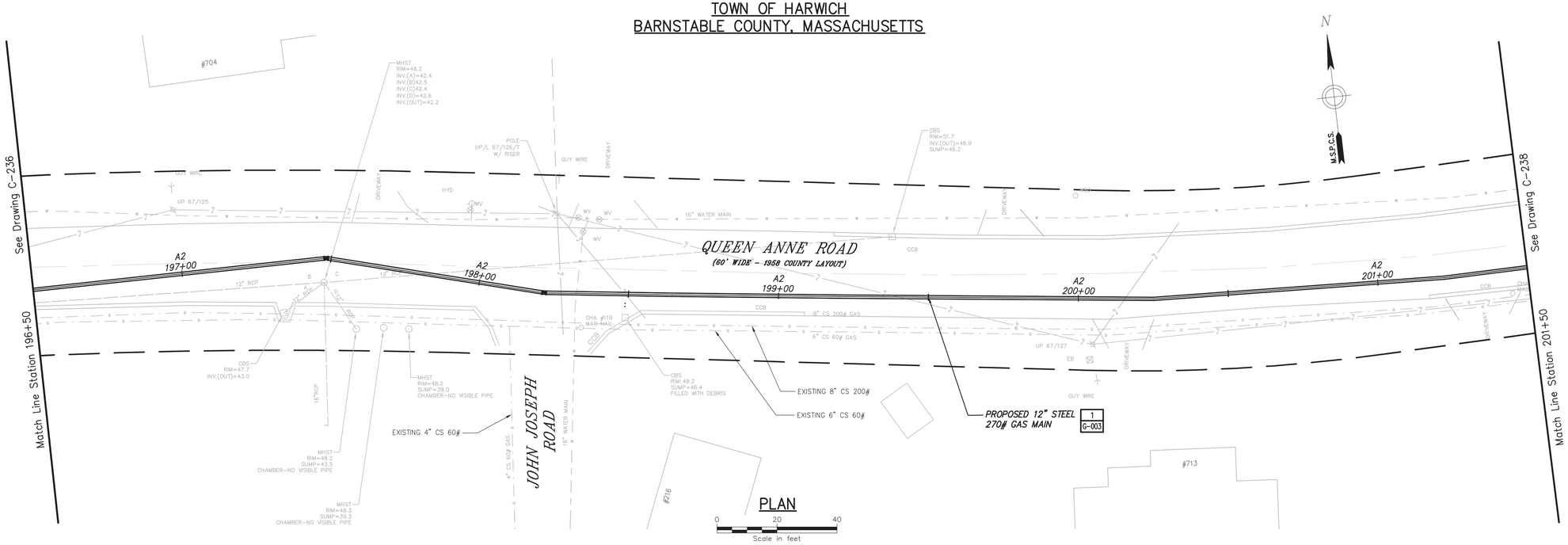
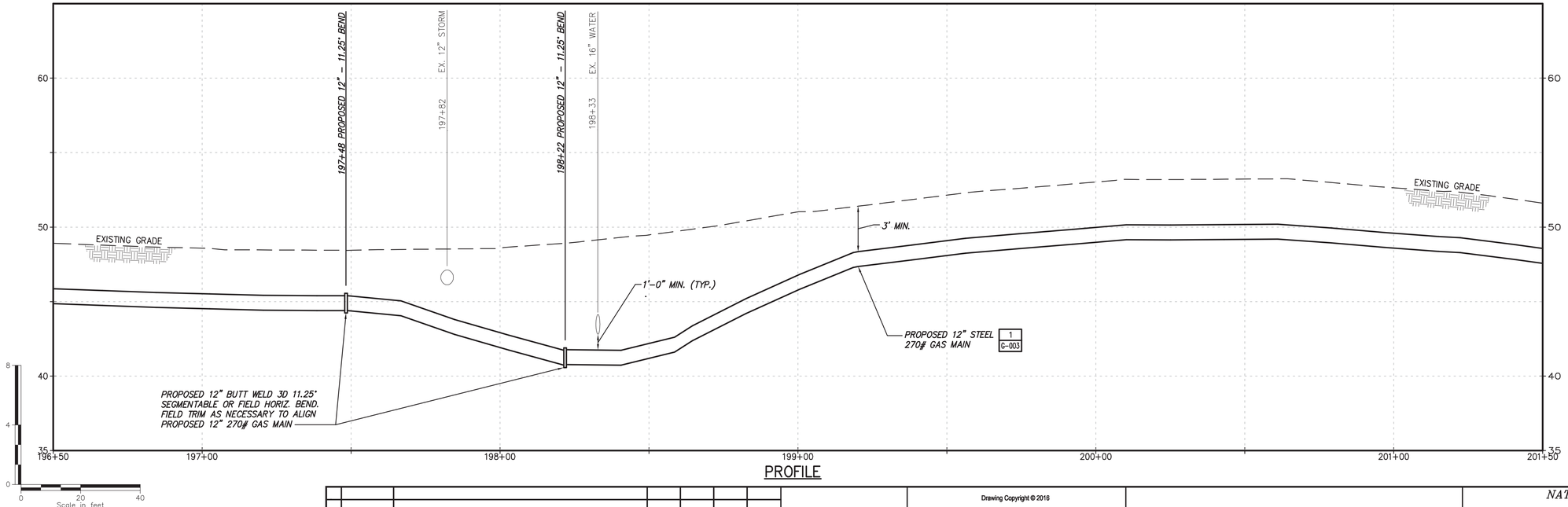
DRAWING NUMBER
C-237

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-237-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-237-29847	SEQUENCE No.	DRAWING NUMBER C-237
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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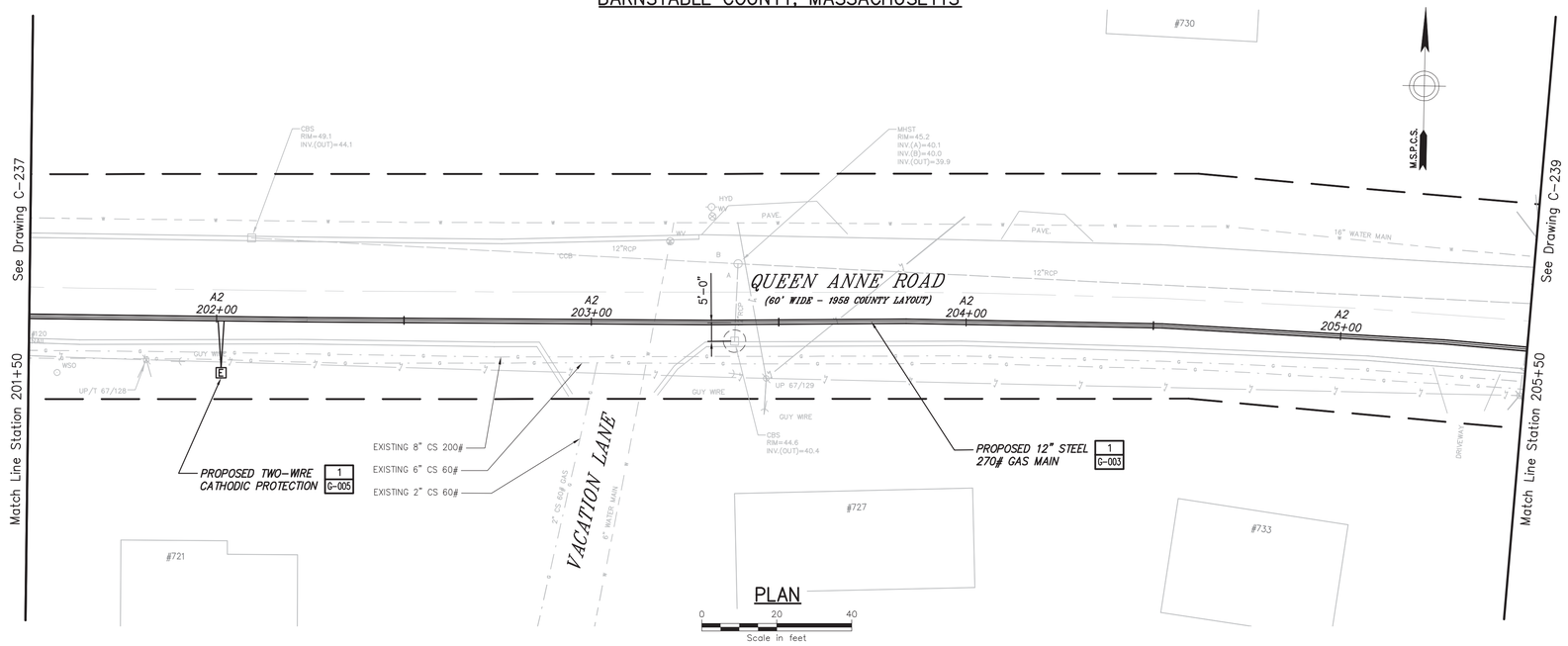
DRAWING NUMBER C-238

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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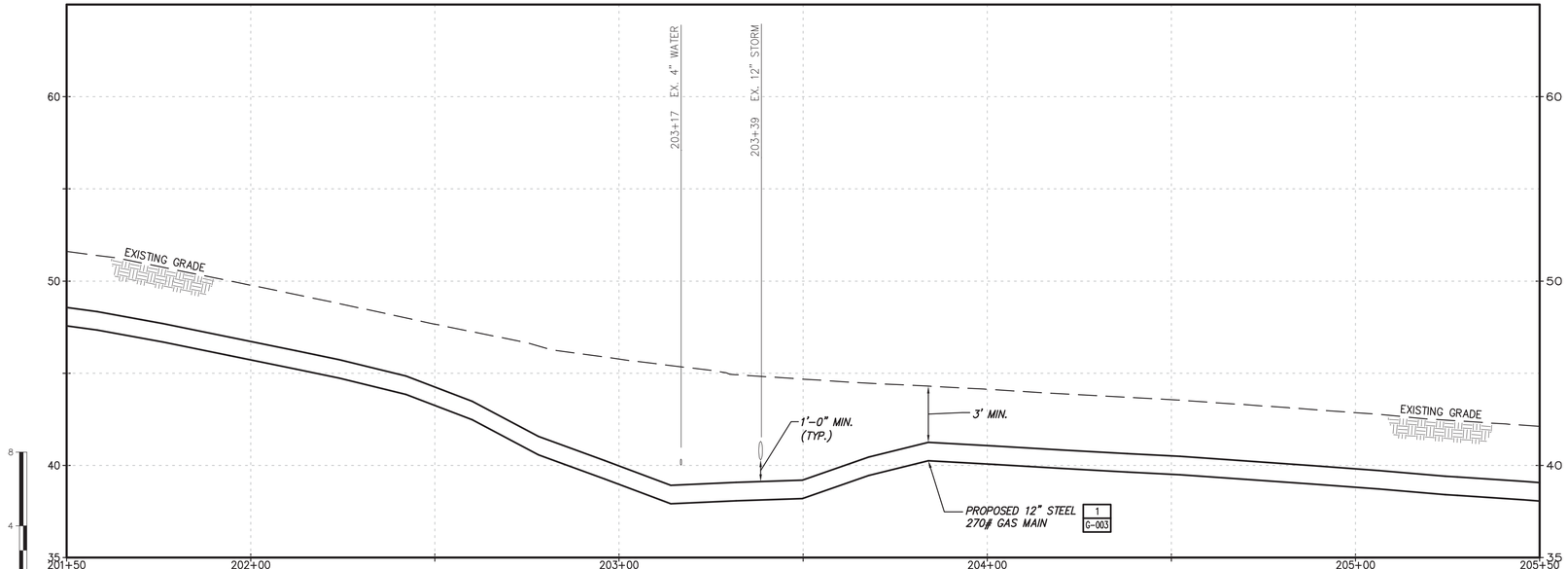
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-238-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-238-29847		C-238

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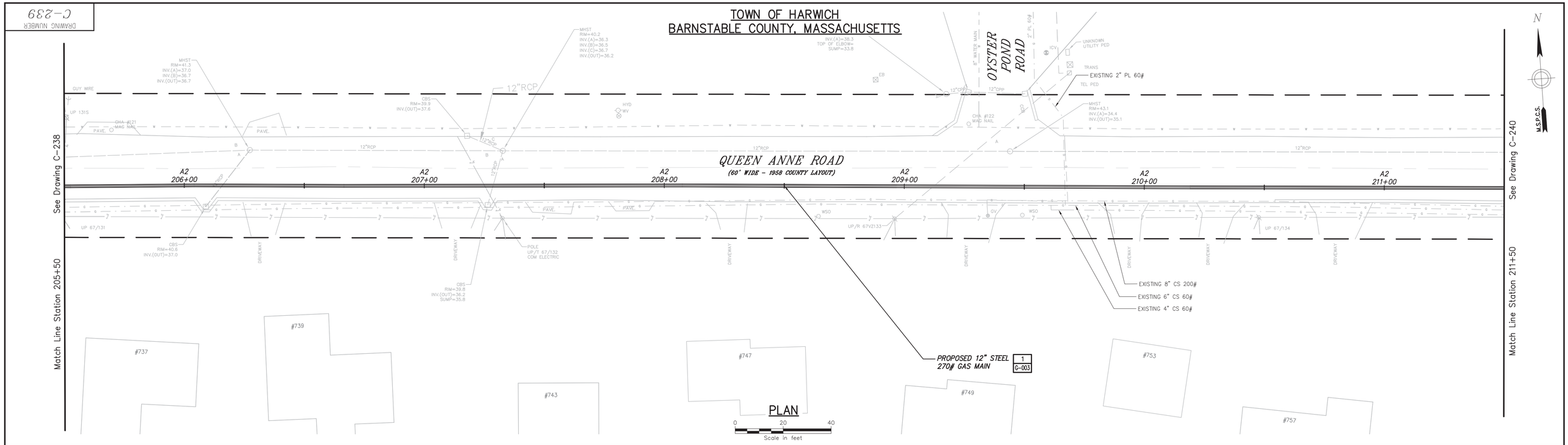
DRAWING NUMBER C-239

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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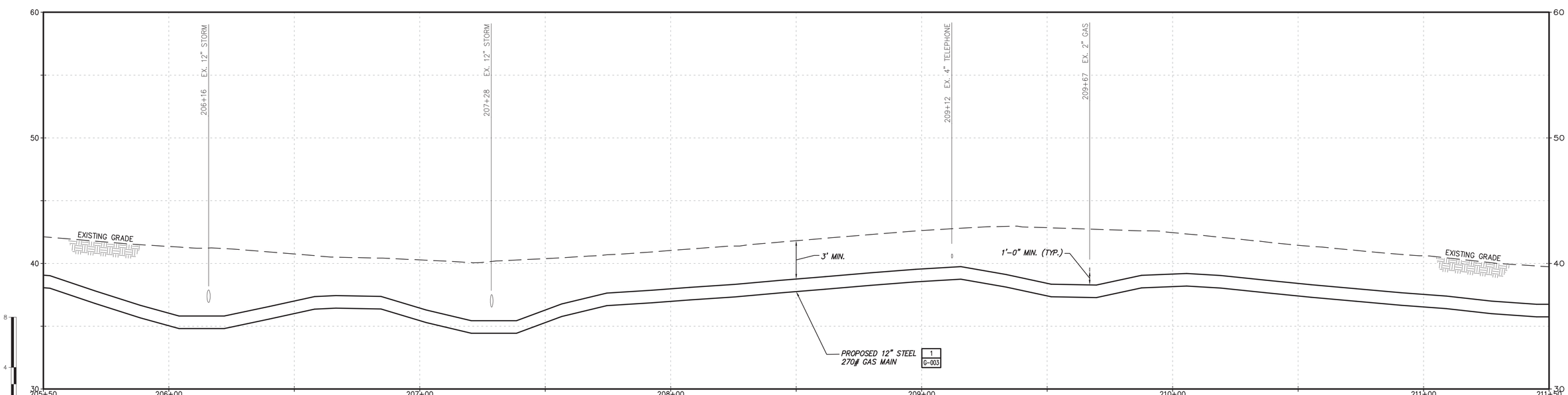
Scale in feet



PROFILE

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Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-239-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-239-29847		C-239

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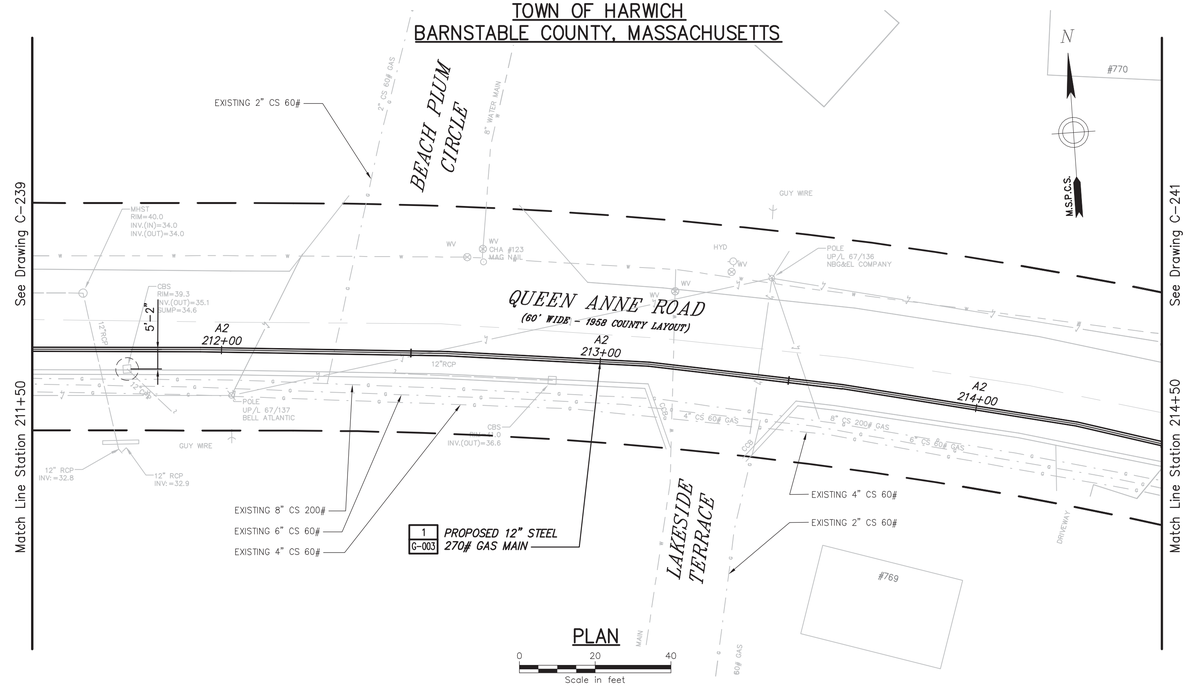
DRAWING NUMBER
C-240

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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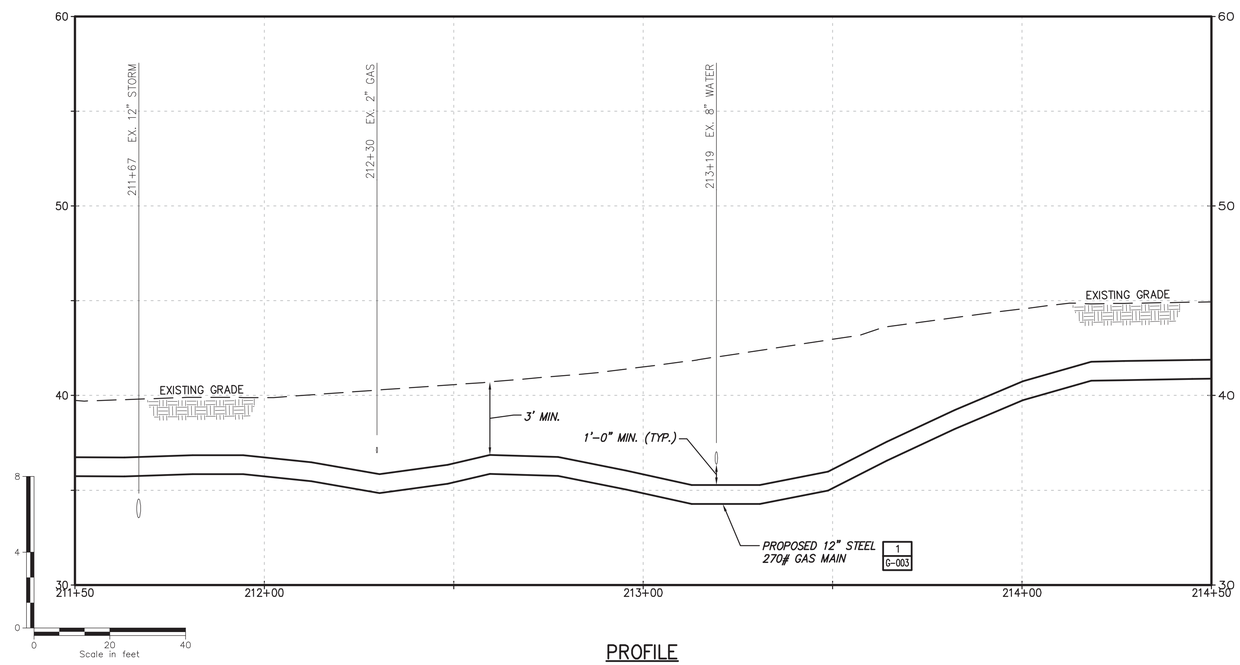

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-240-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-240-29847		C-240

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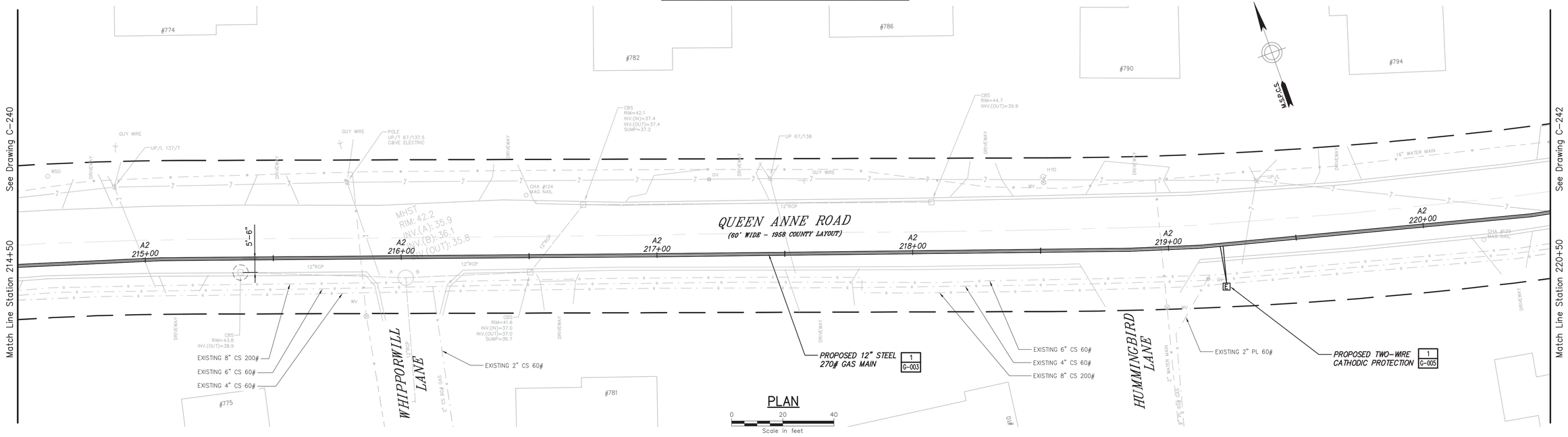
DRAWING NUMBER C-241

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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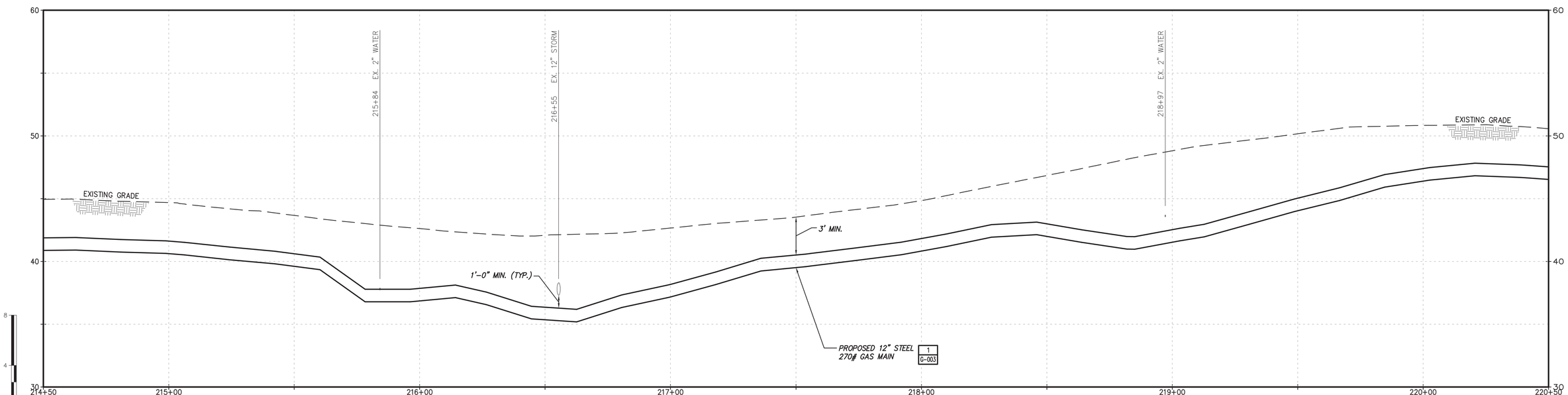
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-241-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-241-29847		C-241

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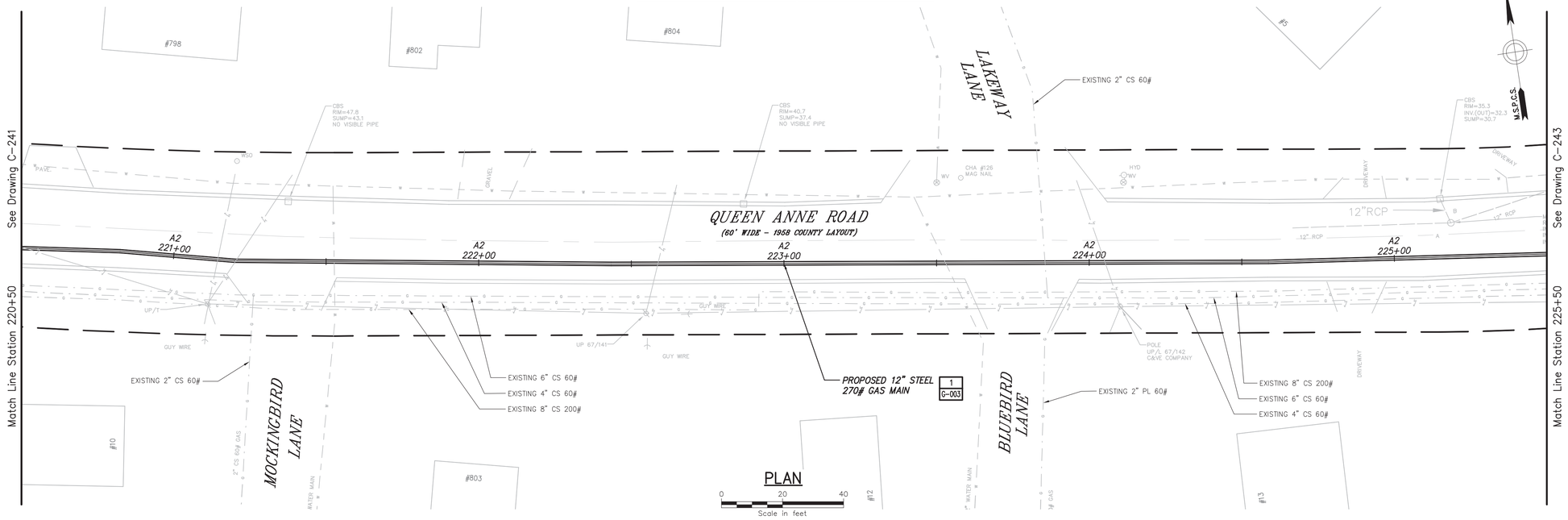
DRAWING NUMBER
C-242

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



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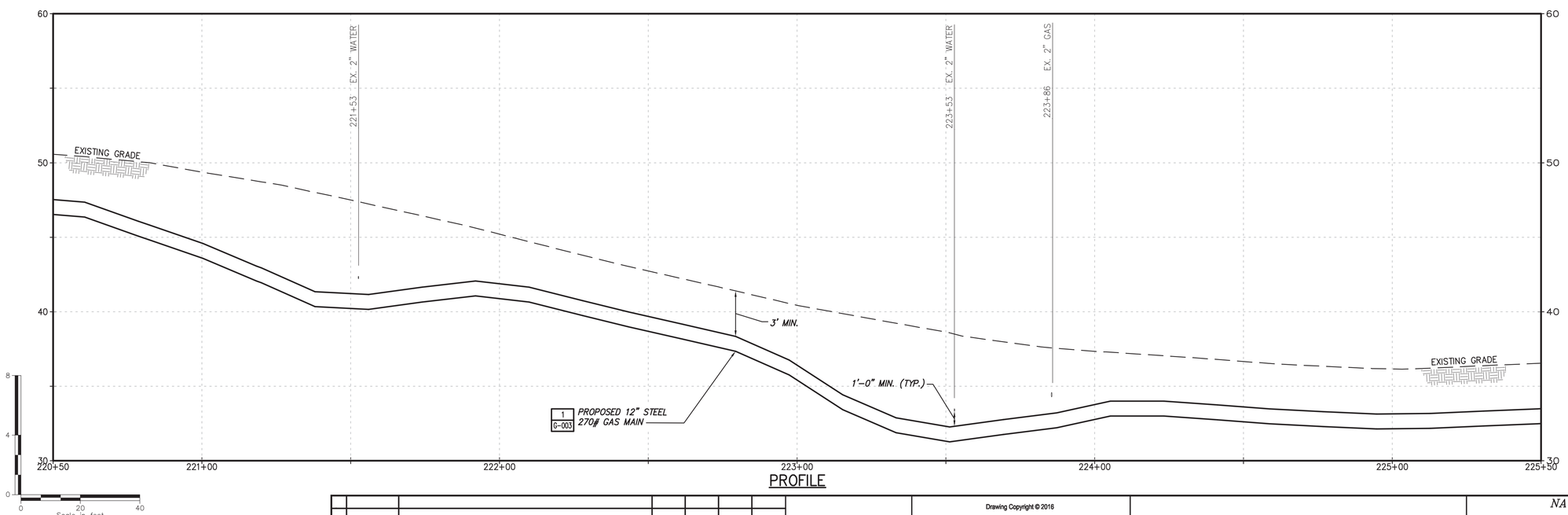

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-242-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-242-29847	SEQUENCE No.	DRAWING NUMBER C-242
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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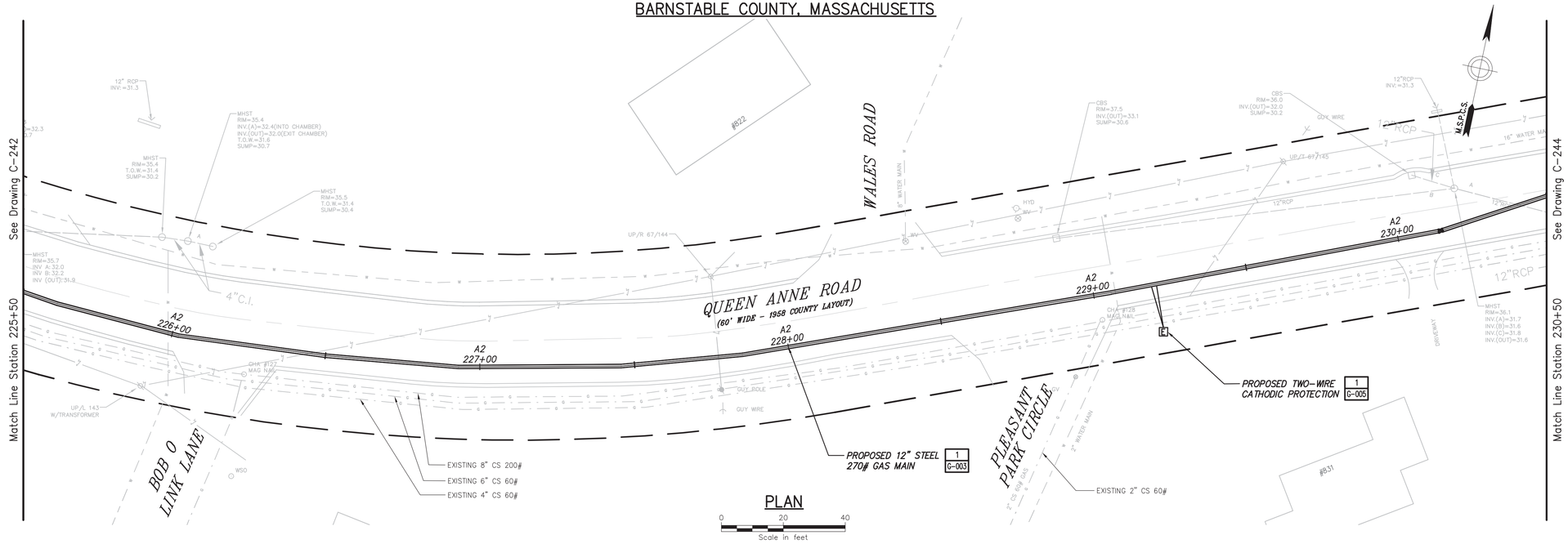
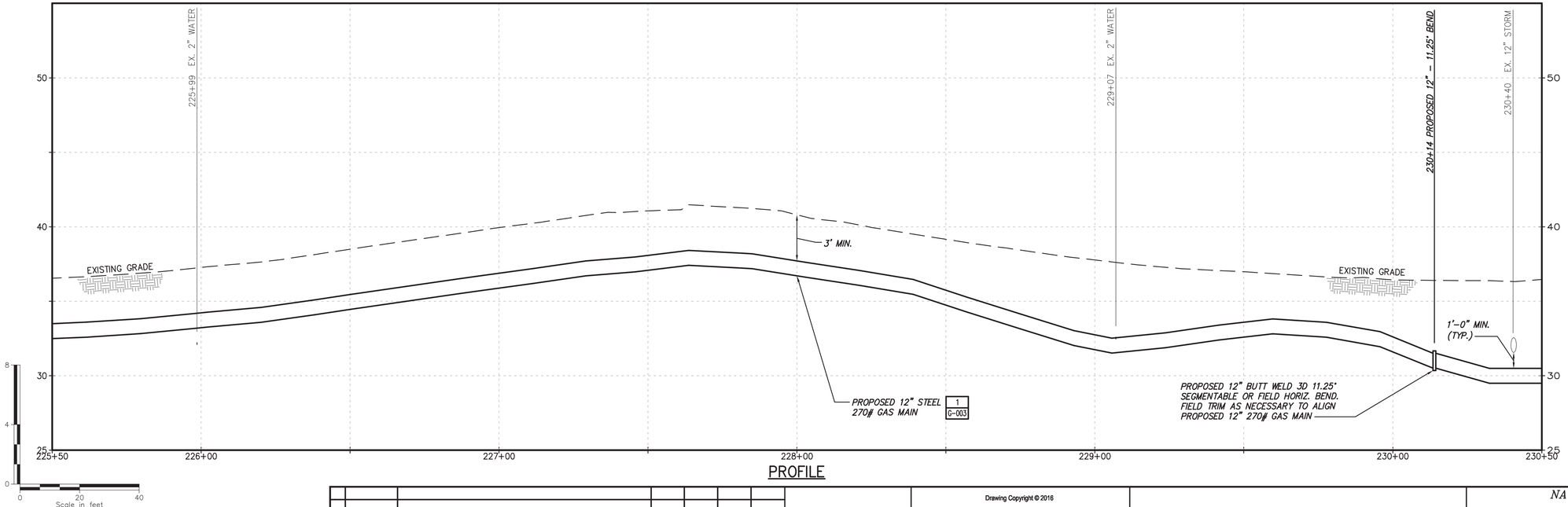
DRAWING NUMBER
C-243

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-243-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-243-29847		C-243

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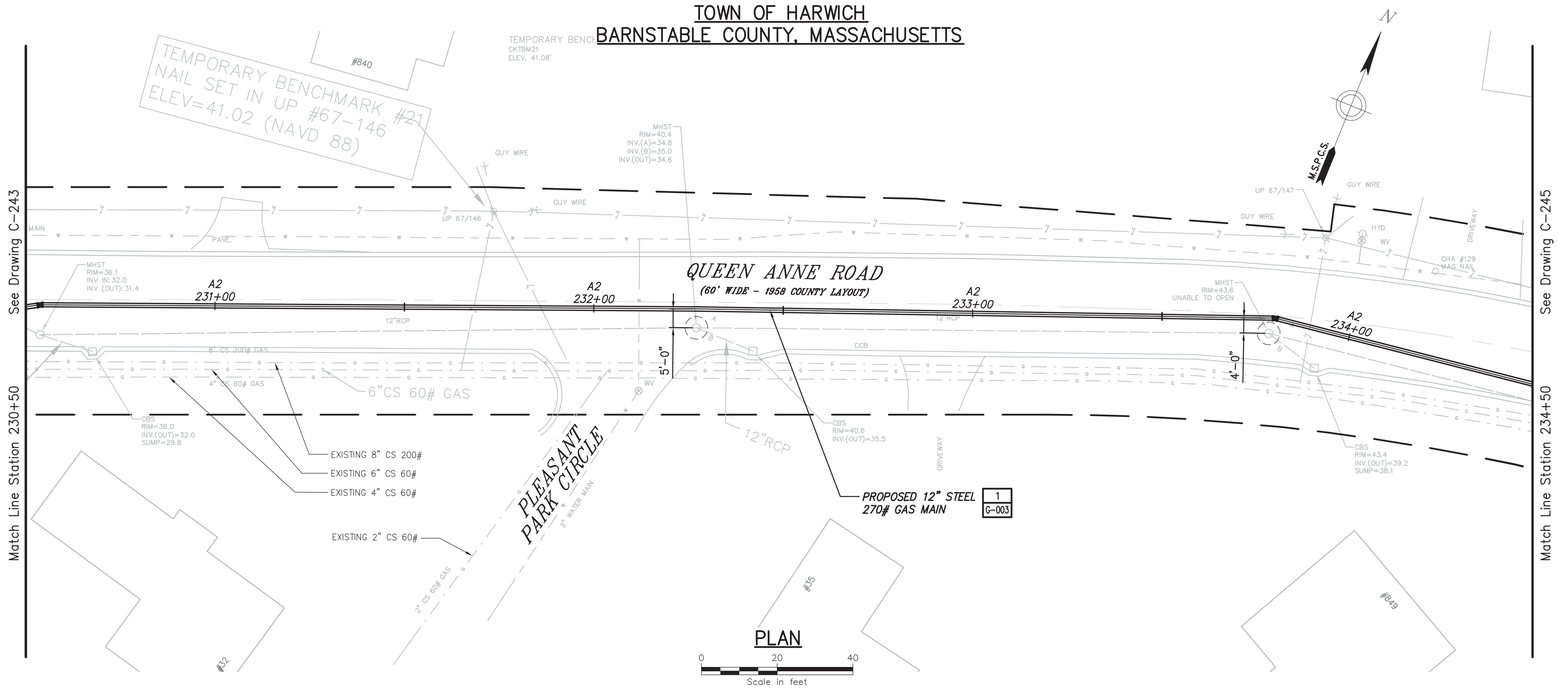
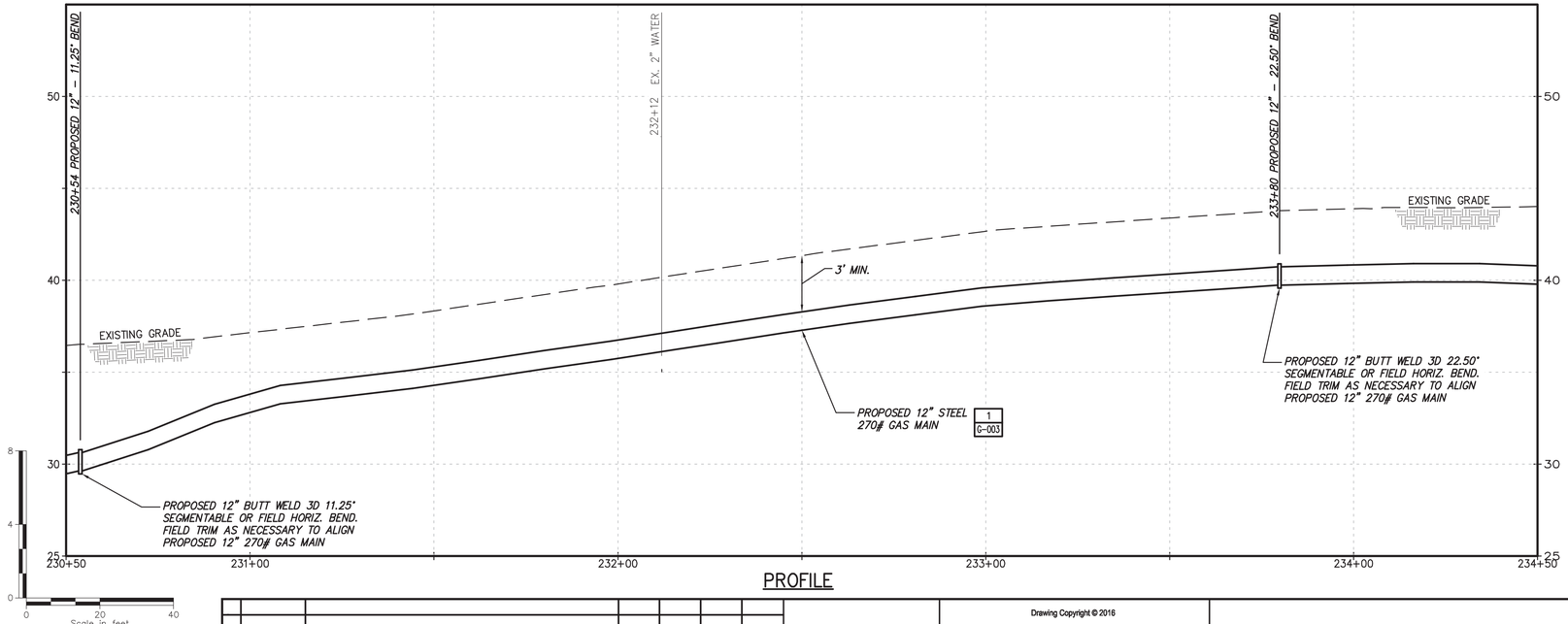
DRAWING NUMBER
C-244

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	CEW	JEO

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Chkd. BCK	Design Engr. CEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-244-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-244-29847		C-244

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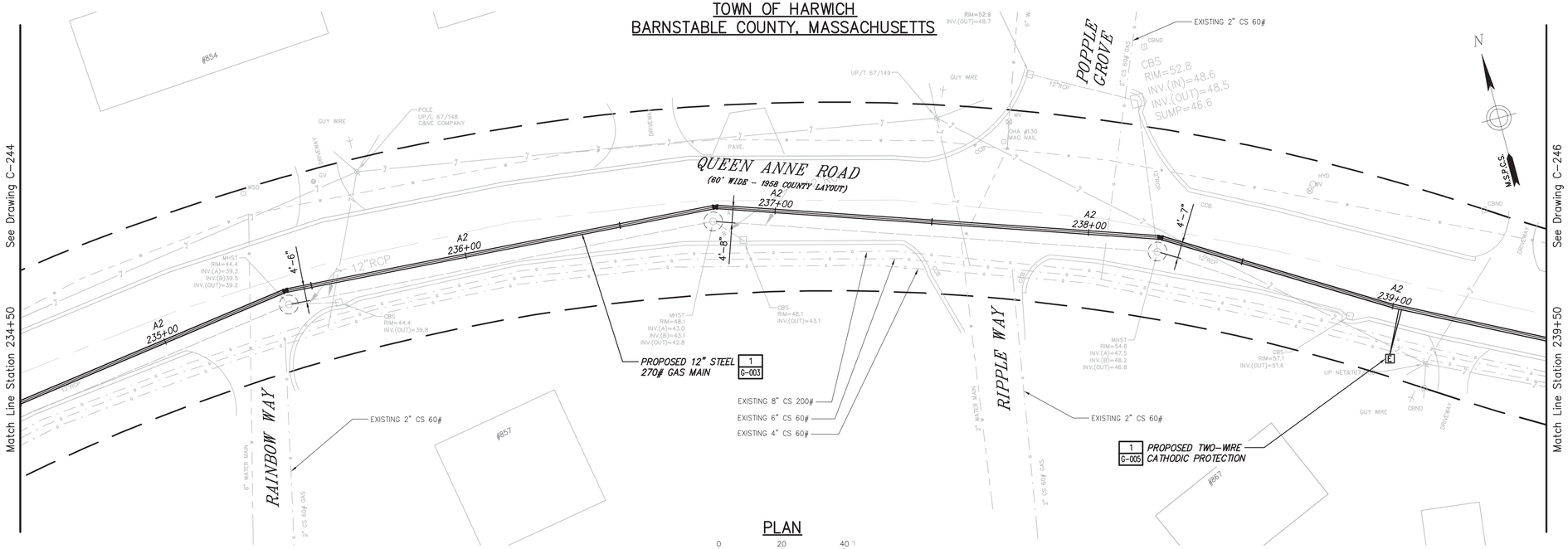
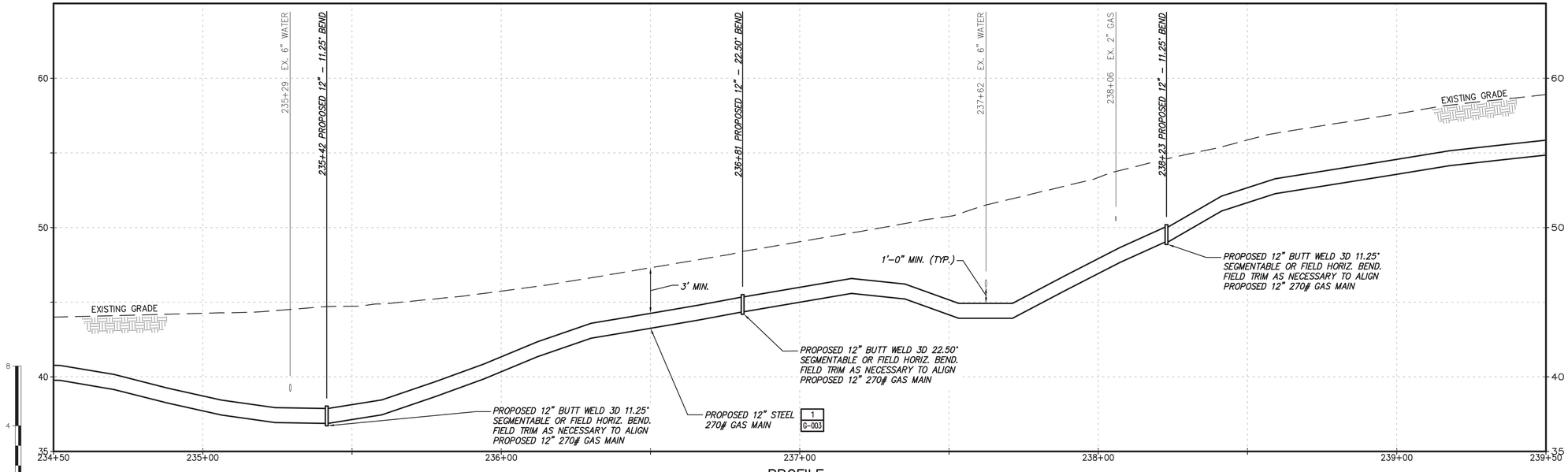
DRAWING NUMBER
C-245

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-245-29847

CAD FILE NAME: C-245-29847
SEQUENCE No.:
DRAWING NUMBER: C-245

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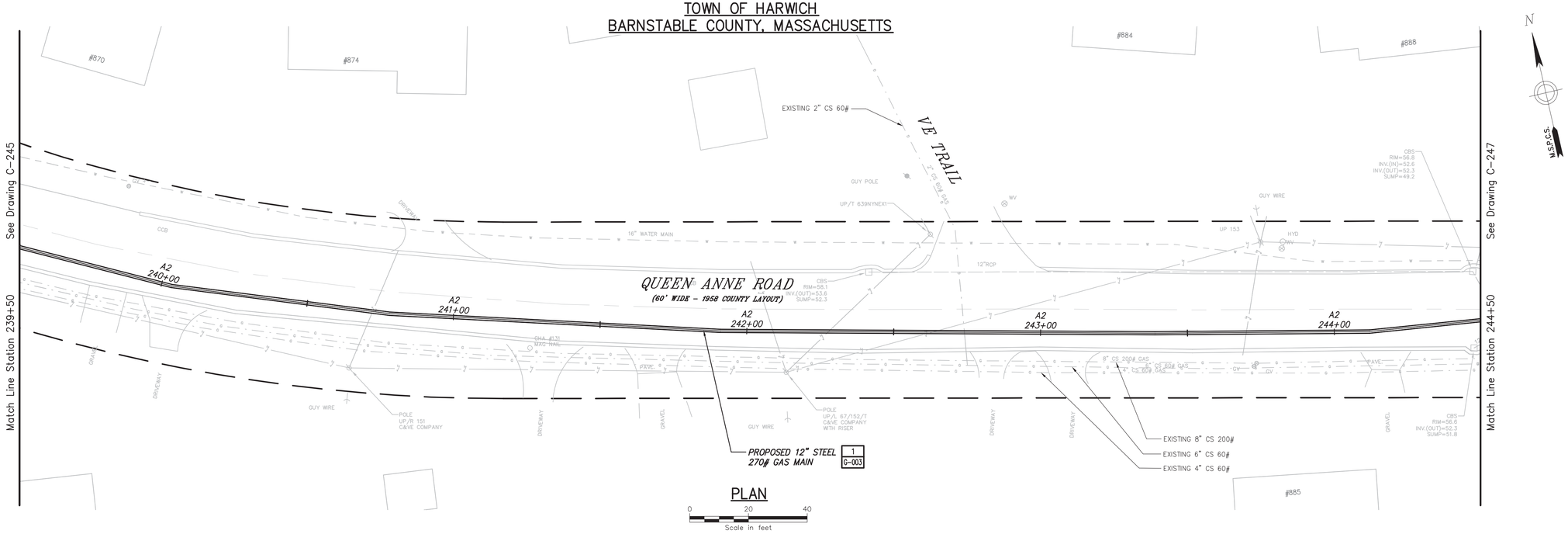
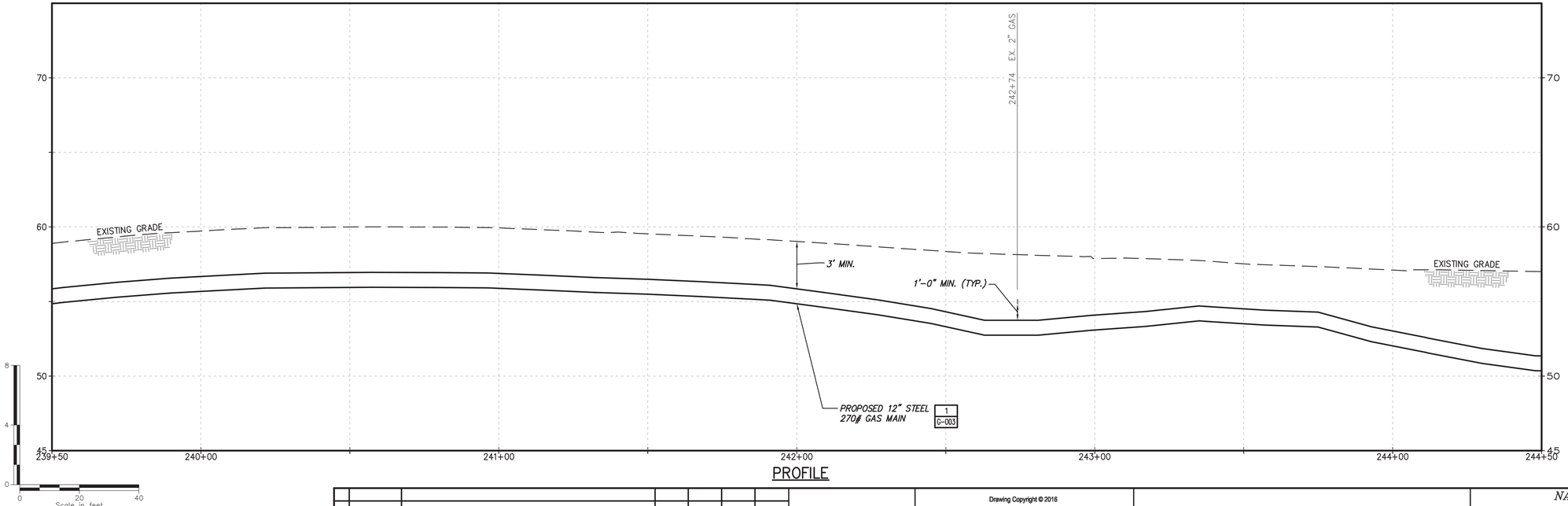
DRAWING NUMBER C-246

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-246-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-246-29847		C-246

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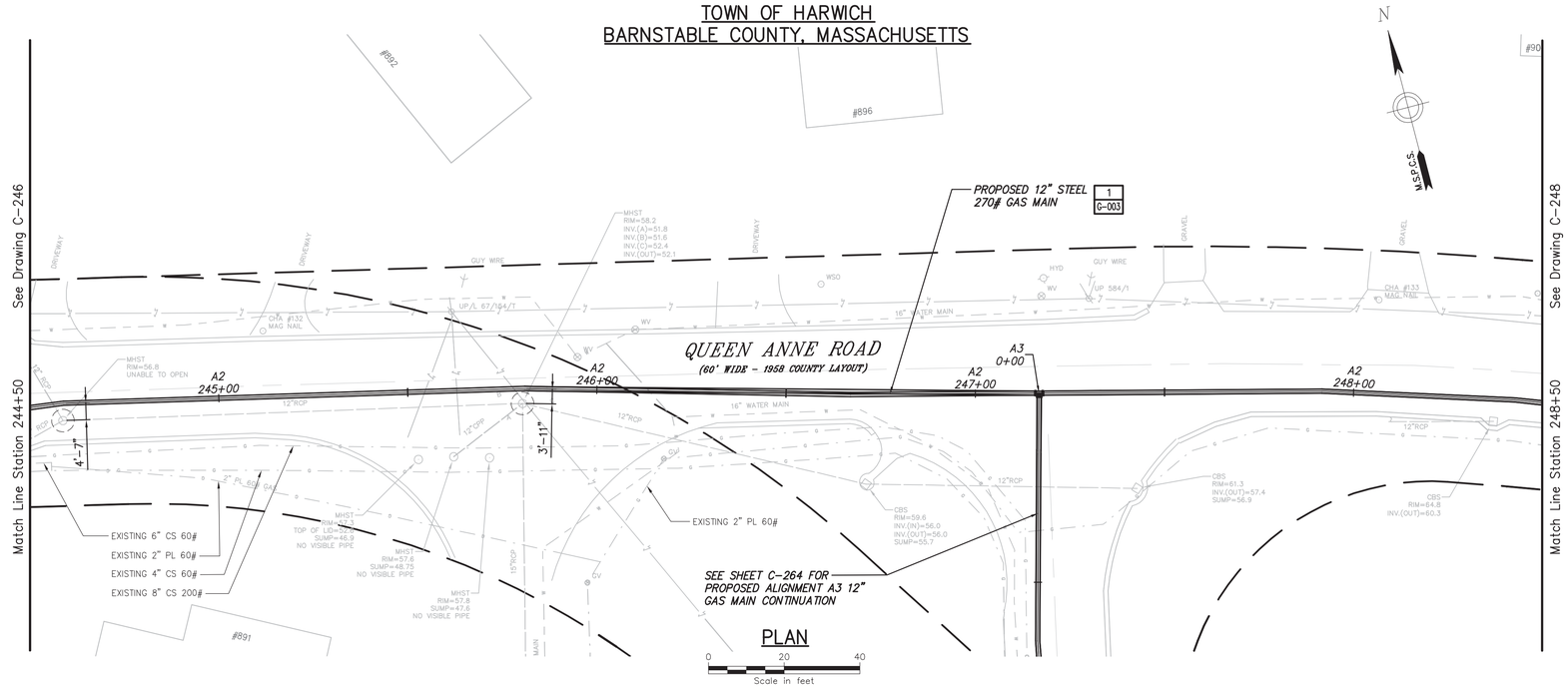
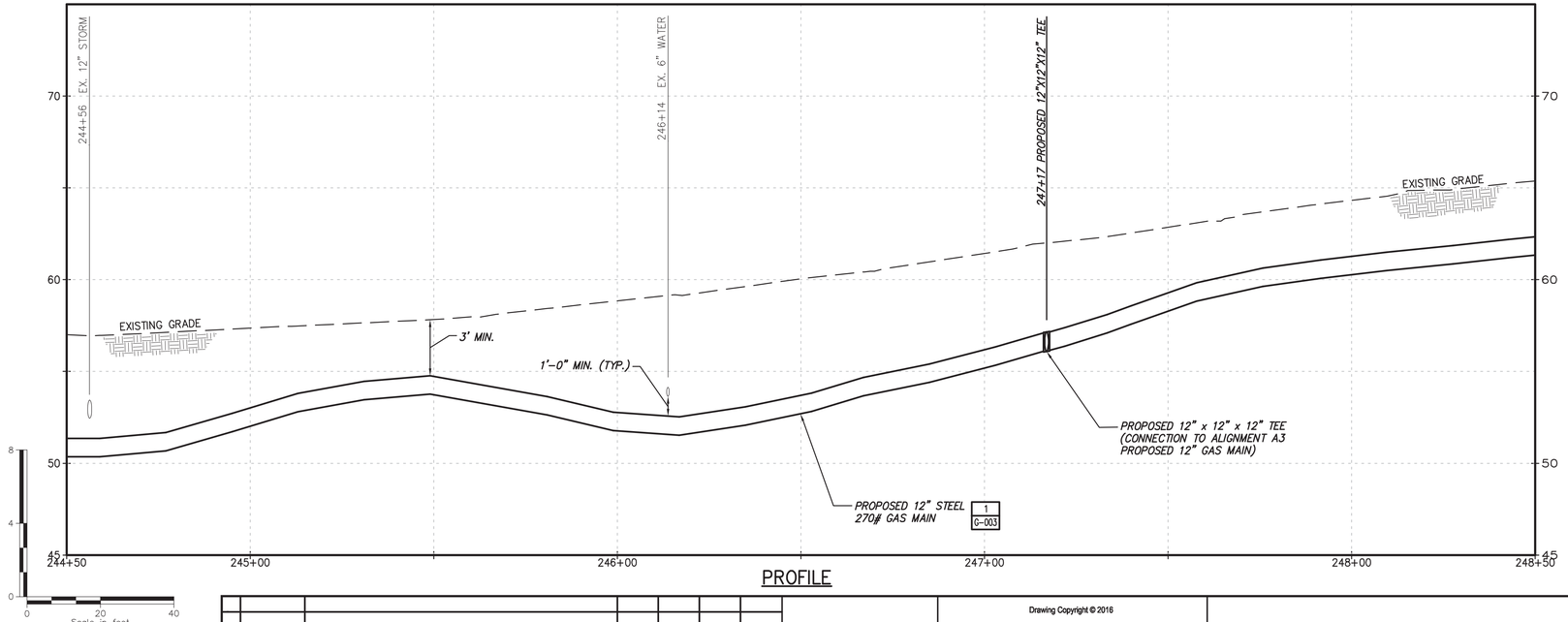
DRAWING NUMBER
C-247

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-247-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-247-29847		C-247

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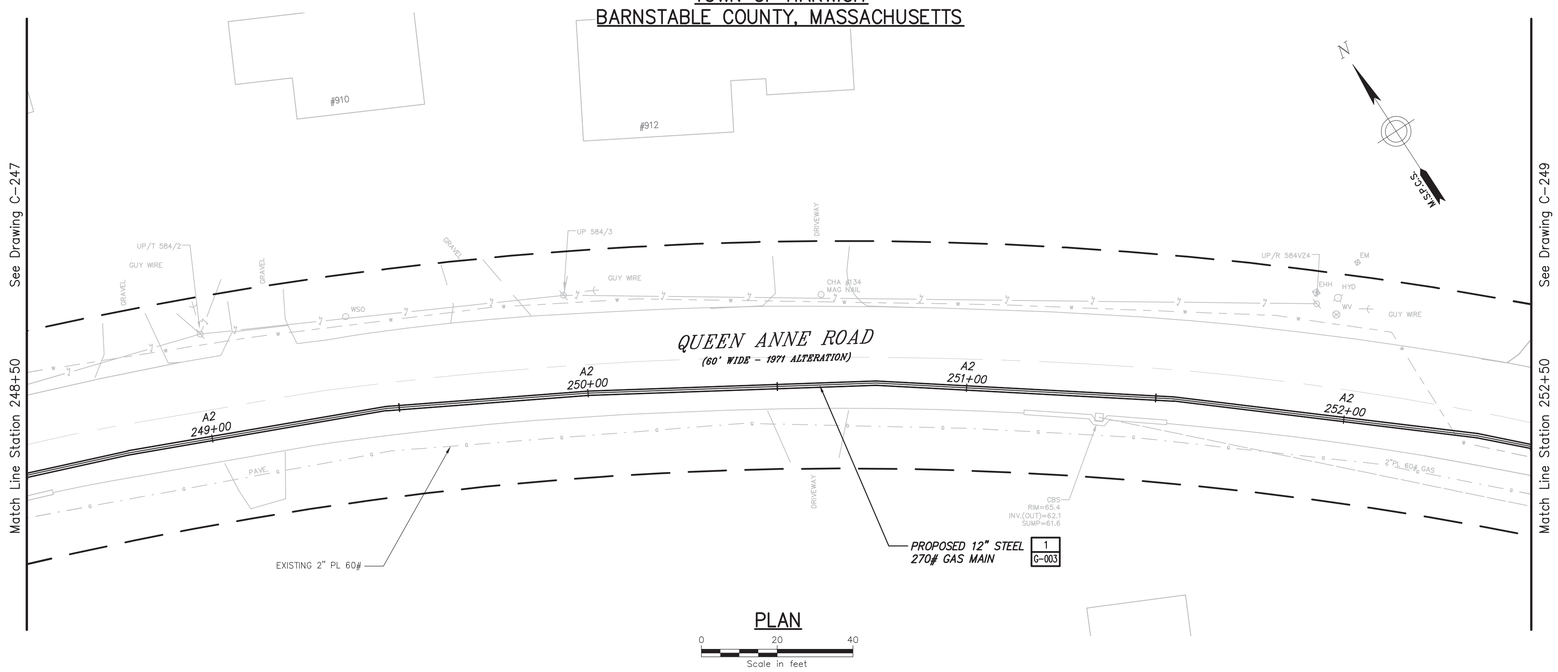
DRAWING NUMBER
C-248

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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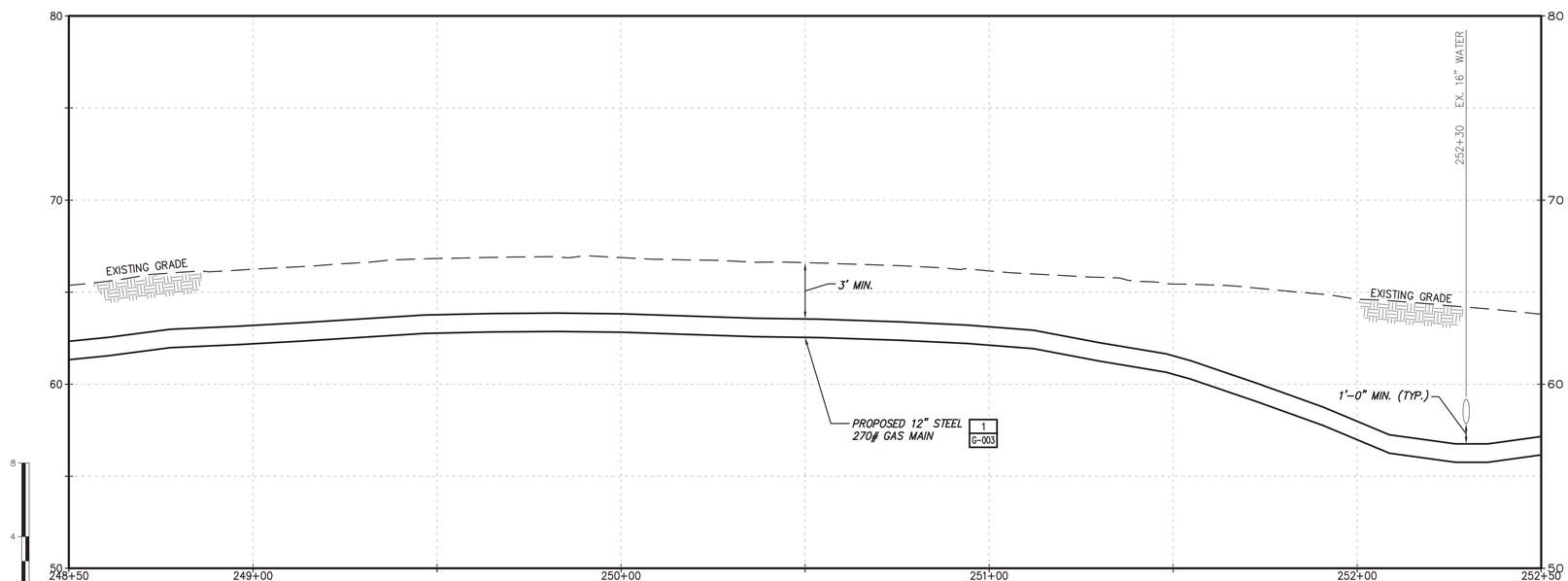
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-248-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-248-29847		C-248

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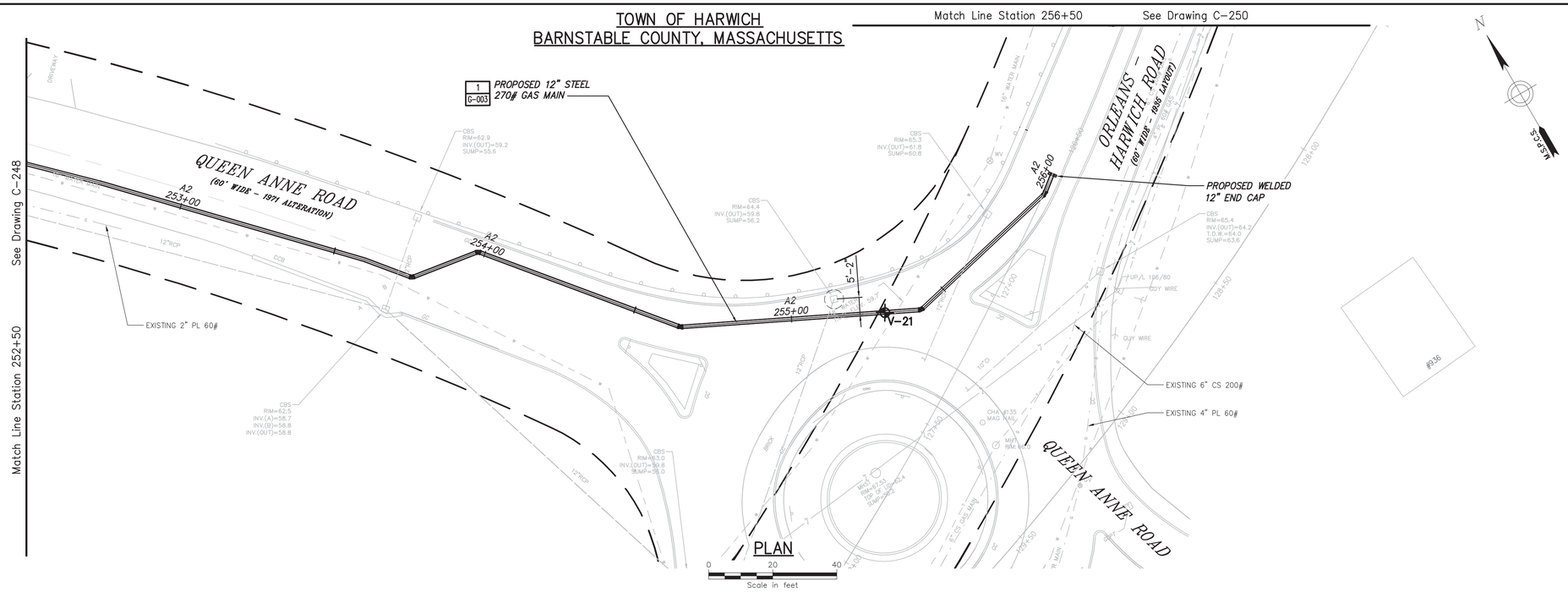
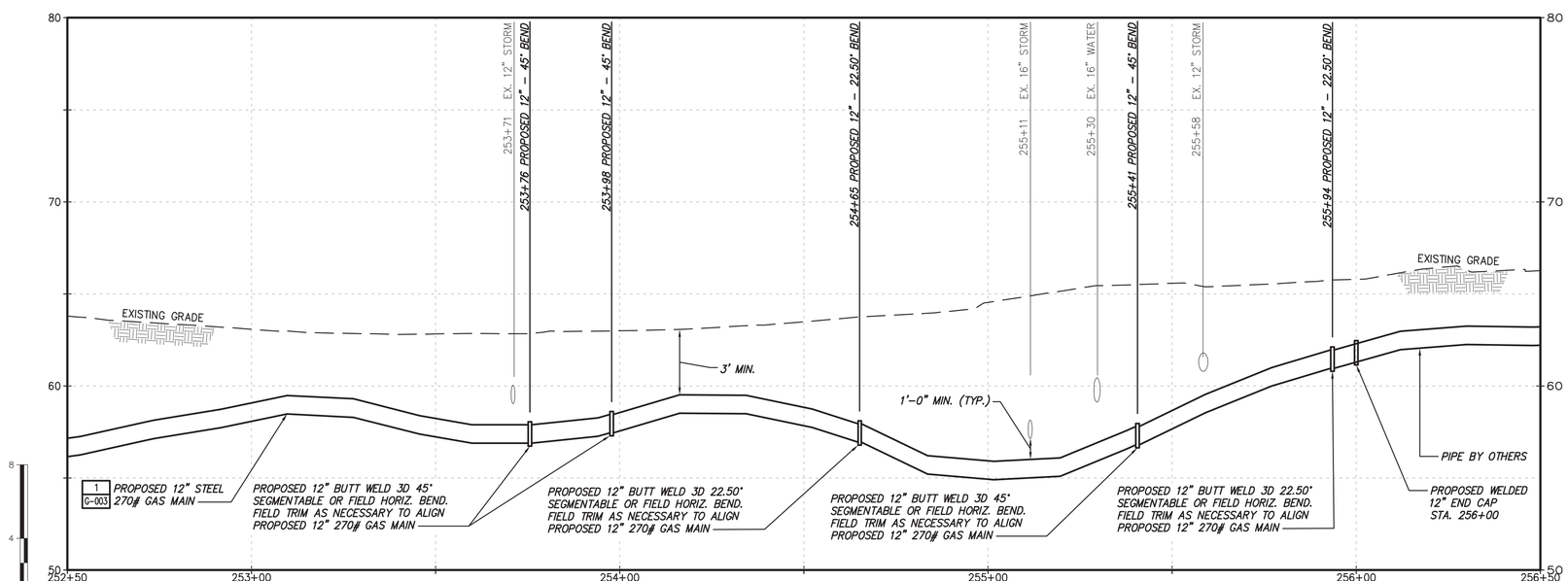
DRAWING NUMBER C-249

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-249-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-249-29847		C-249

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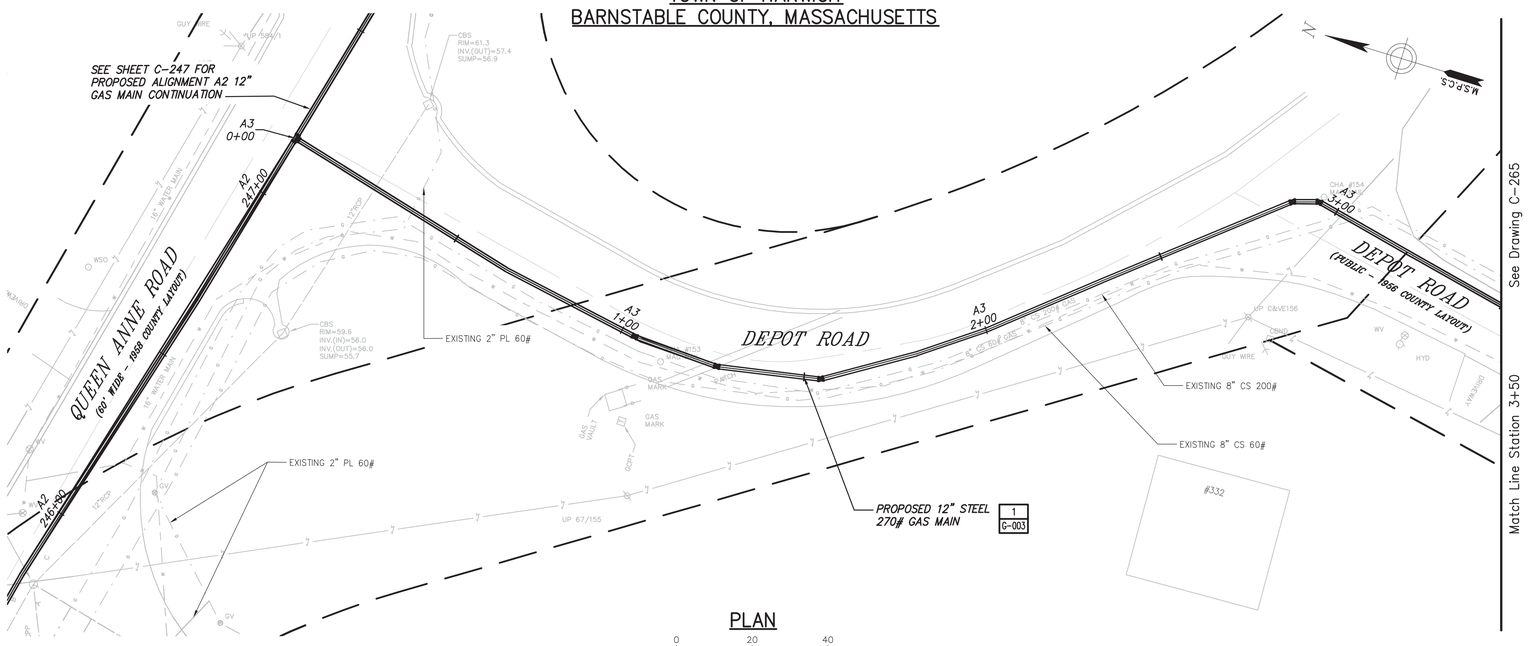
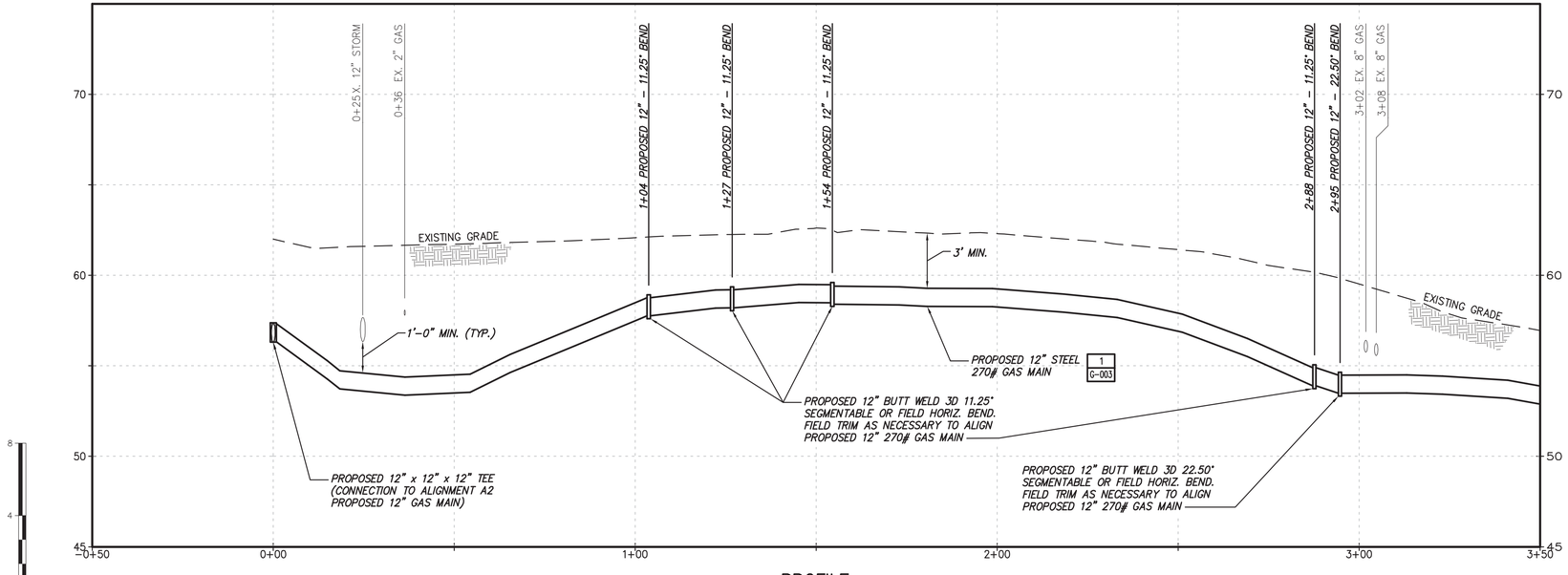
DRAWING NUMBER C-264

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-264-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-264-29847		C-264

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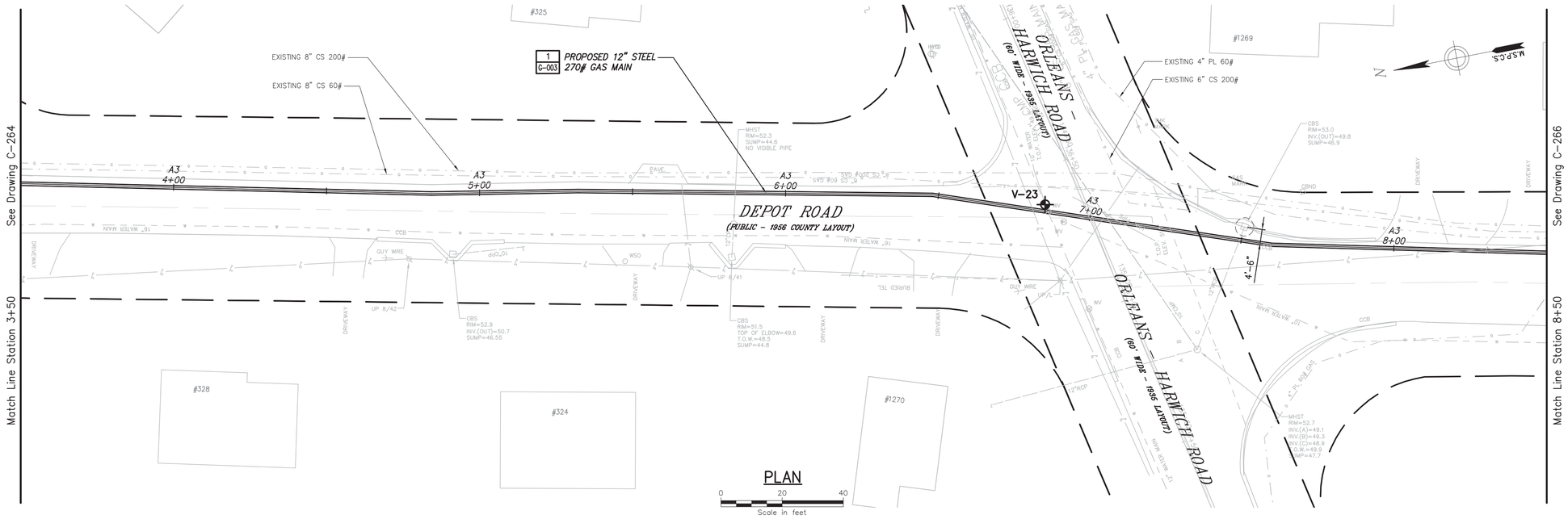
DRAWING NUMBER C-265

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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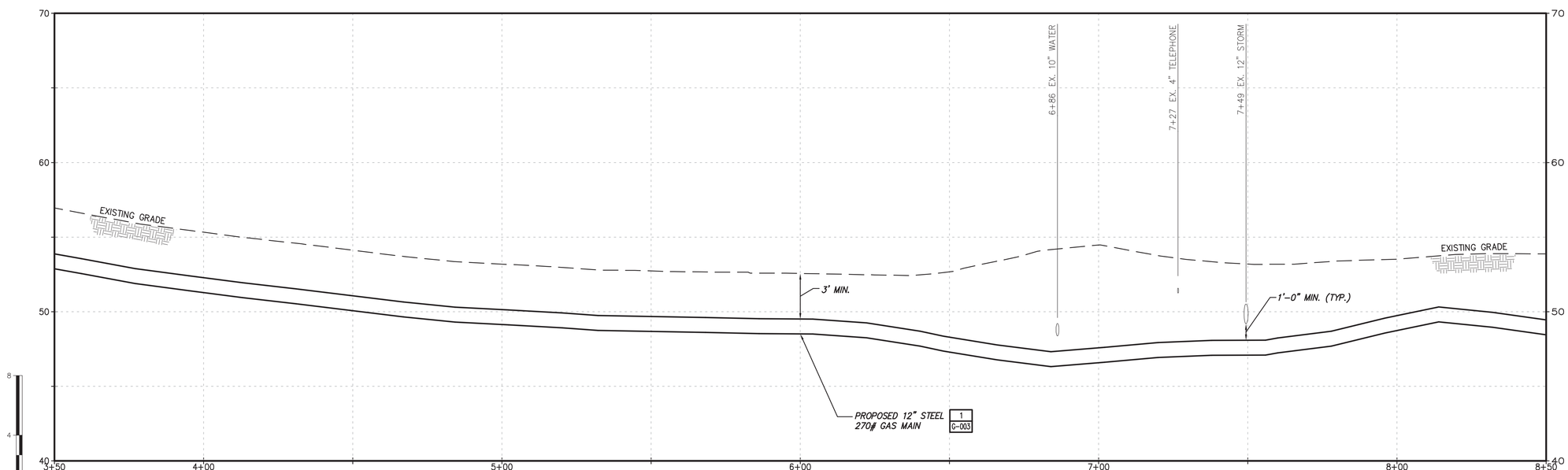
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-265-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-265-29847		C-265

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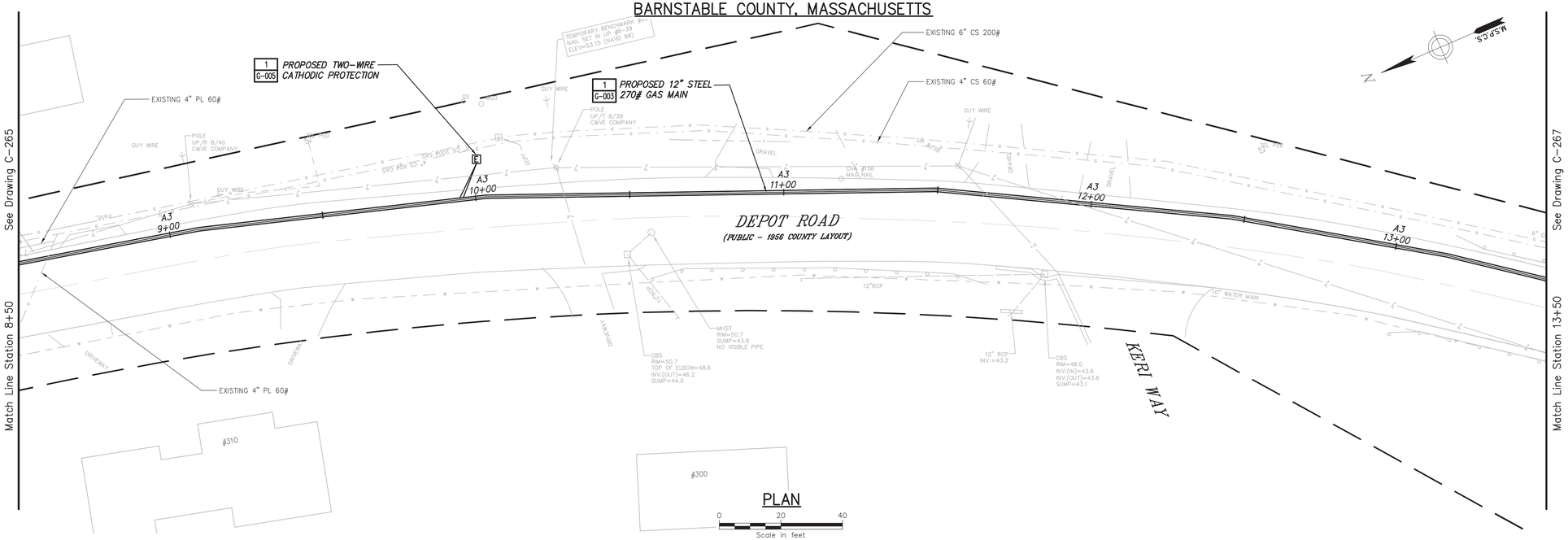
DRAWING NUMBER C-266

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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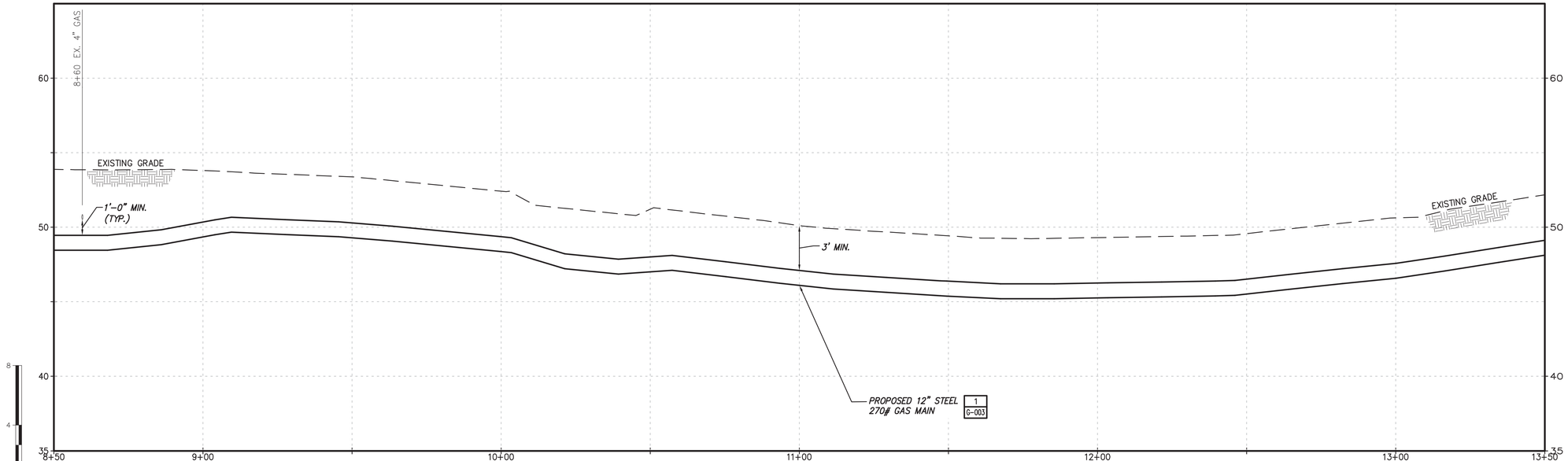
Scale in feet



PROFILE

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Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
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CONSTRUCTION DRAWINGS

C-266-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-266-29847	SEQUENCE No.	DRAWING NUMBER C-266
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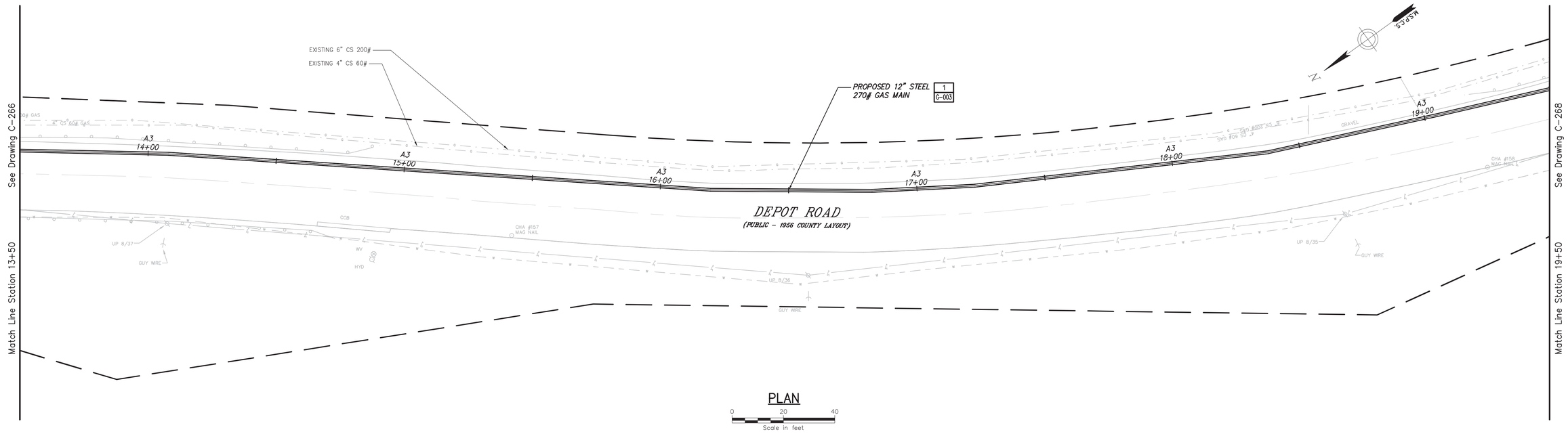
DRAWING NUMBER C-267

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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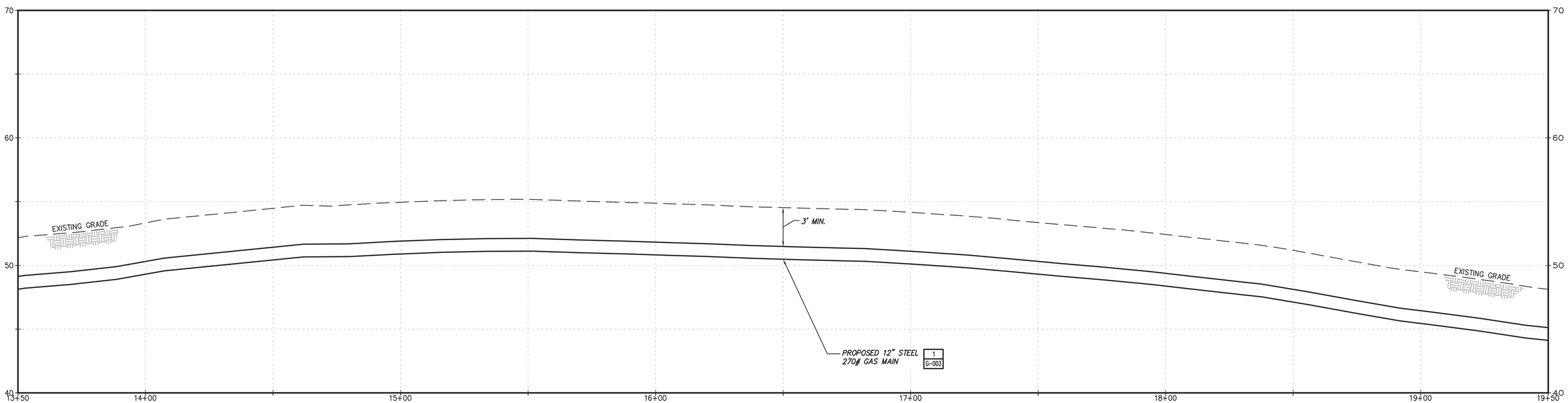
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-267-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-267-29847		C-267

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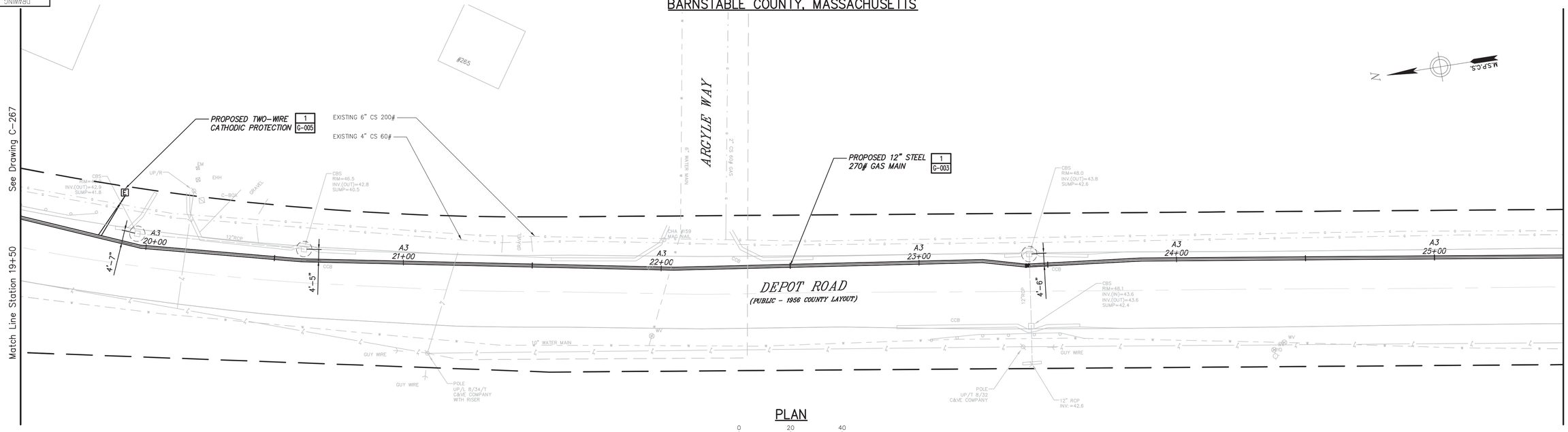
DRAWING NUMBER C-268

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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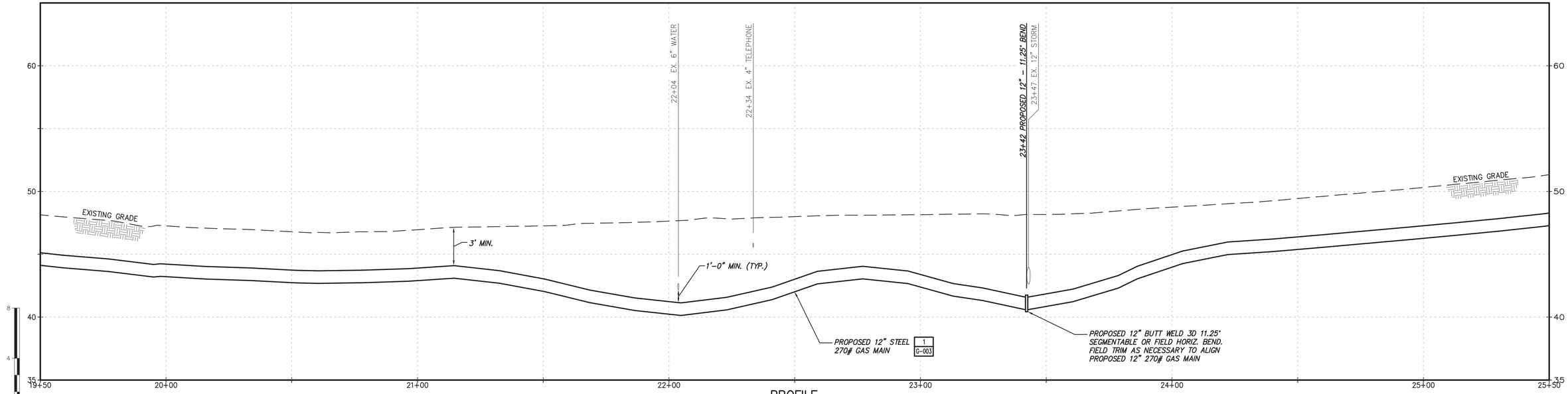
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-268-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-268-29847		C-268

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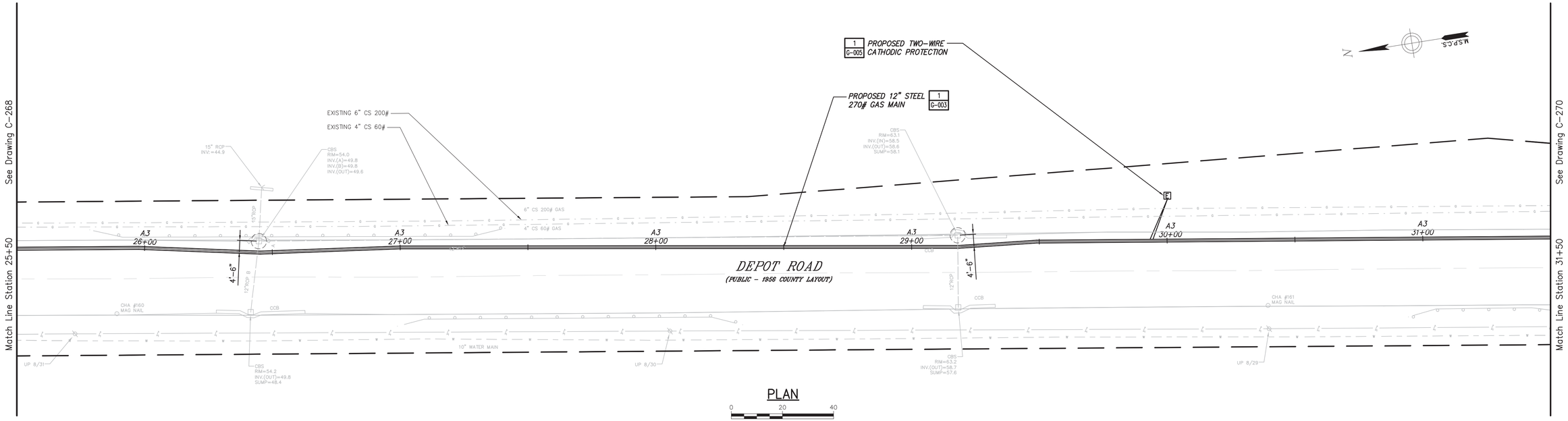
DRAWING NUMBER C-269

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

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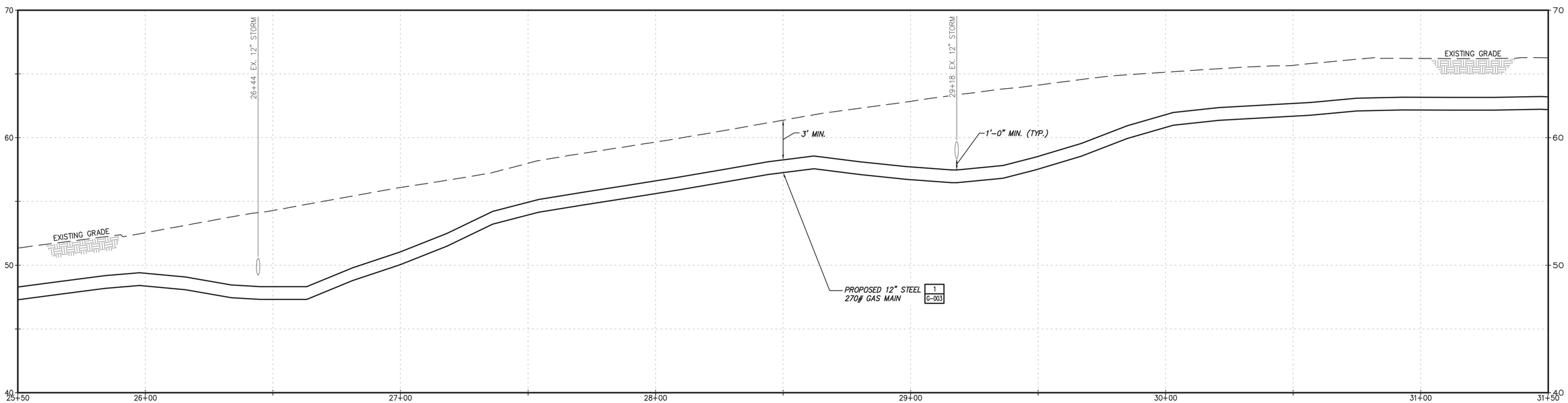
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-269-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-269-29847		C-269

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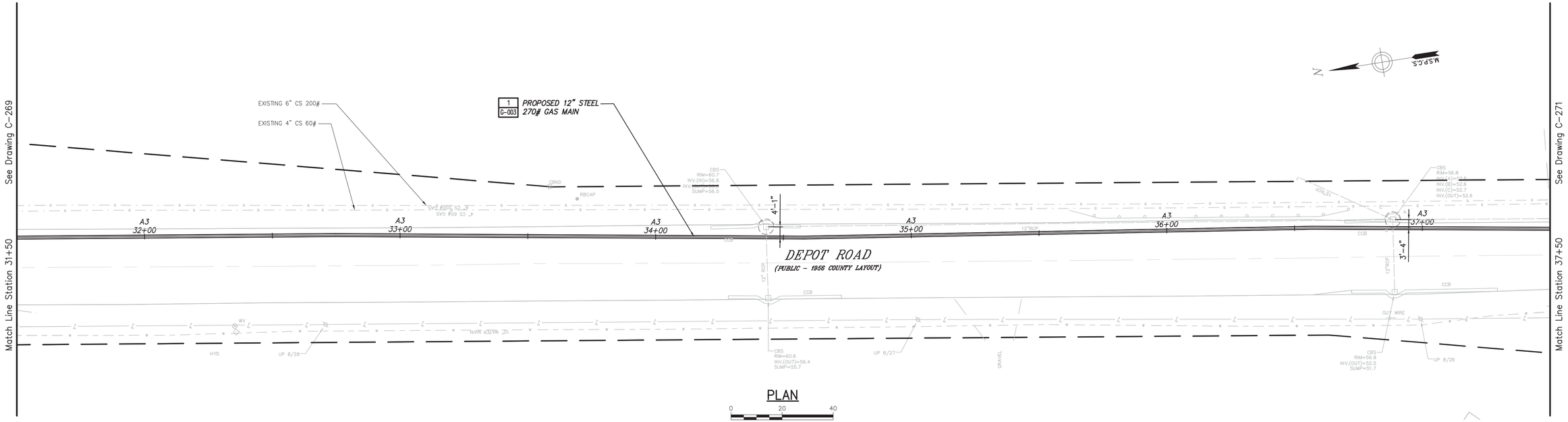
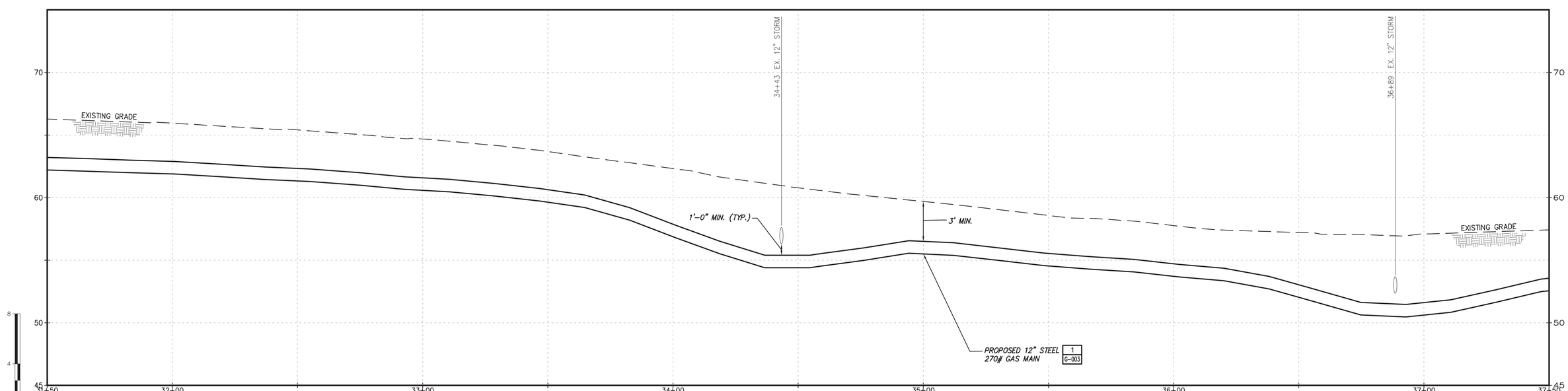
DRAWING NUMBER C-270

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-270-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-270-29847		C-270

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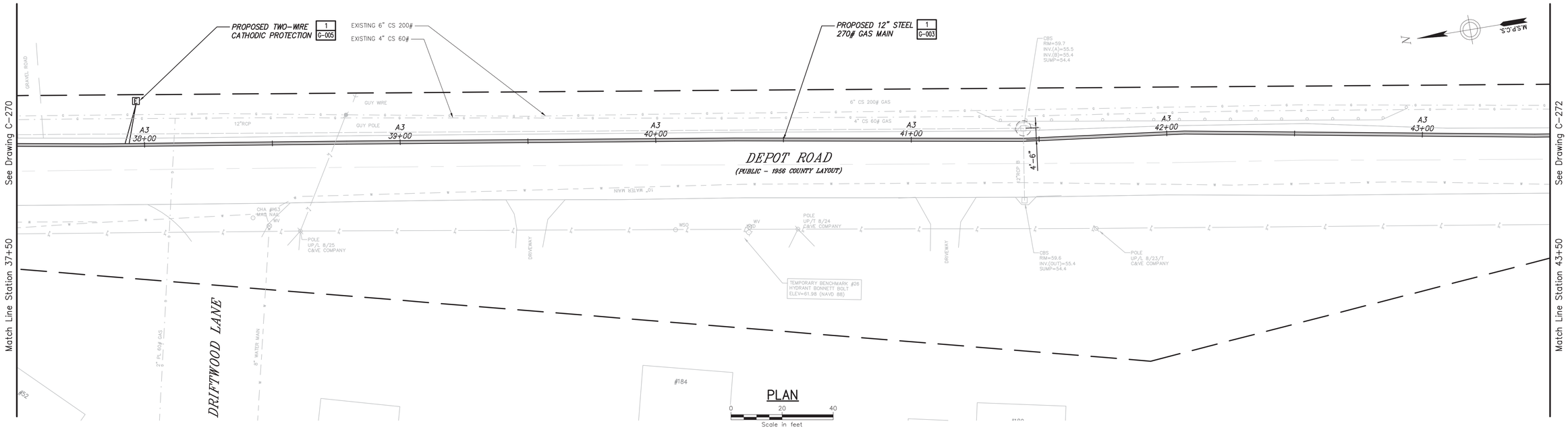
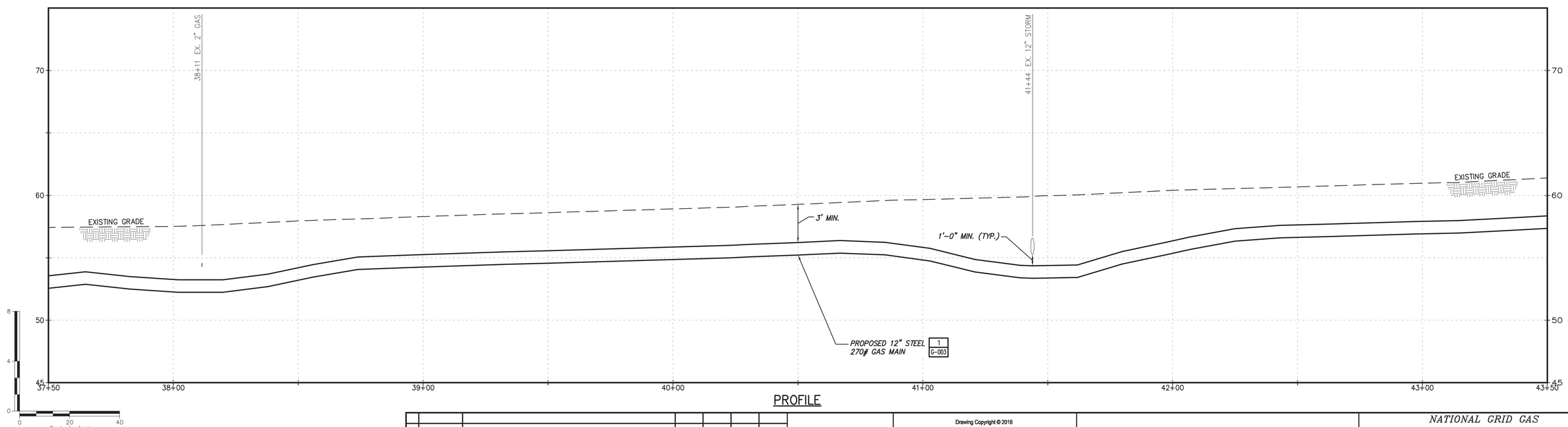
DRAWING NUMBER
C-271

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN



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No	Date	Revision	By	Chkd.	Engr.	Supv.
0	01/22/2016	ISSUED FOR PERMITTING	RJT	BCK	GEW	JEO

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Drawn RJT	Date 01/22/2016	Scale AS NOTED
Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS

C-271-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-271-29847		C-271

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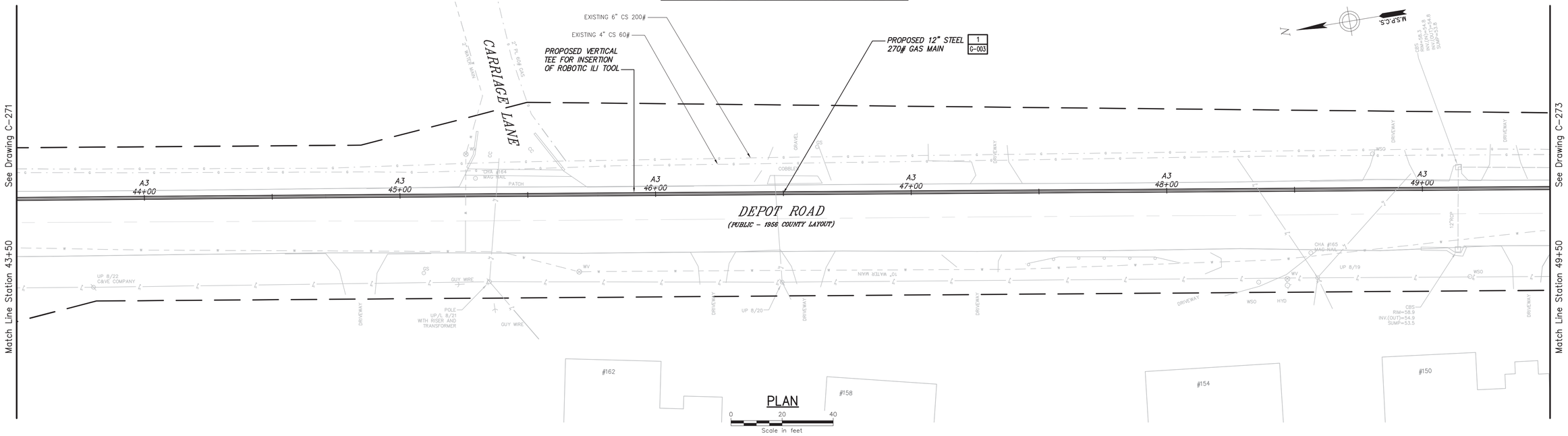
Saved: 1/20/2016 3:07:43 PM Plotted: 1/22/2016 3:13:47 PM

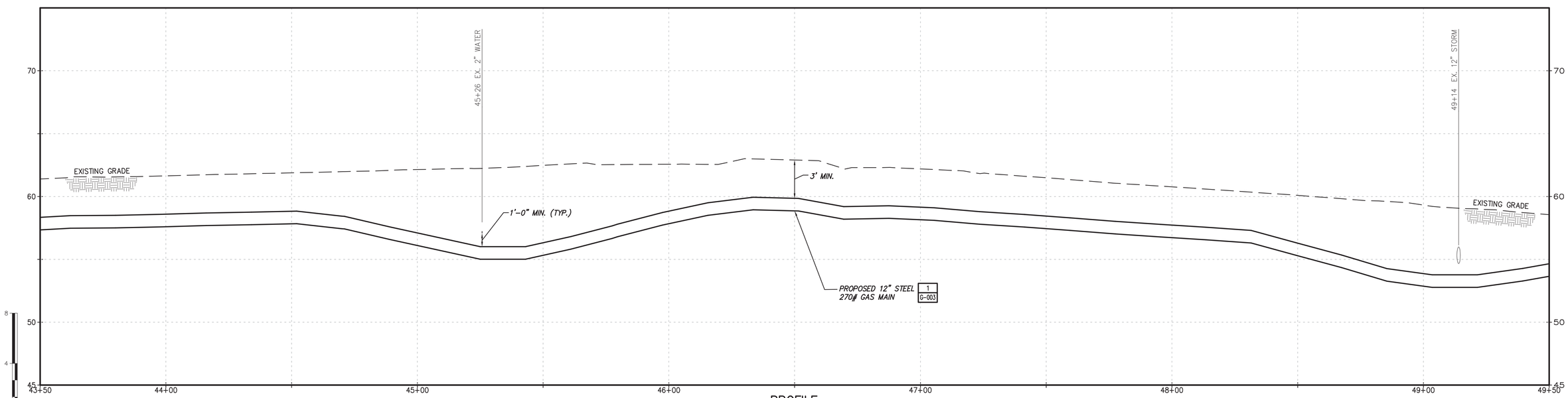
DRAWING NUMBER
C-272

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-272-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-272-29847		C-272

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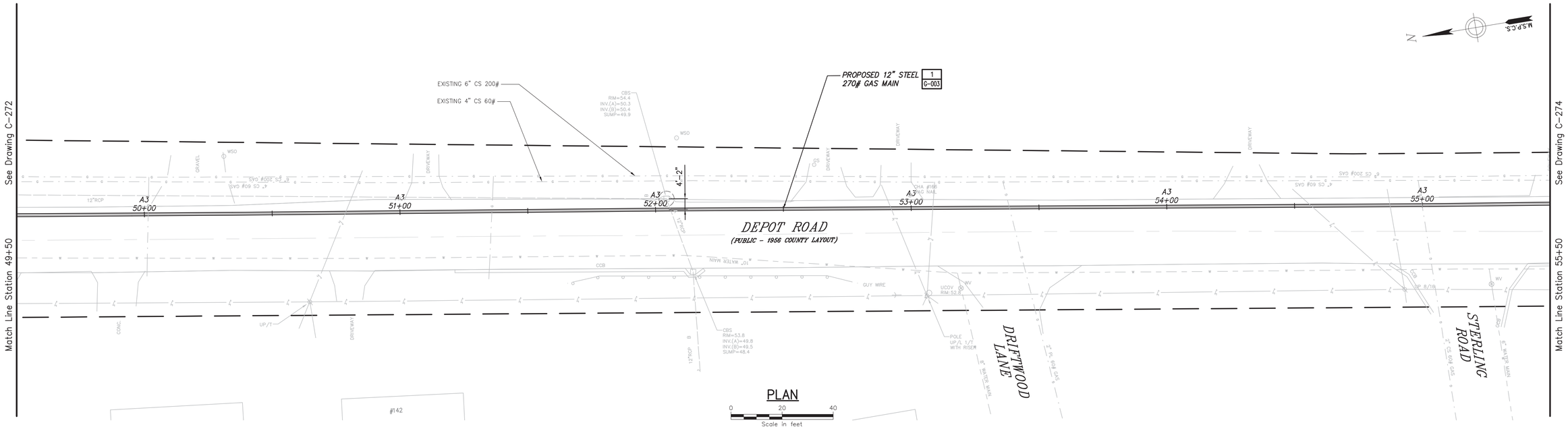
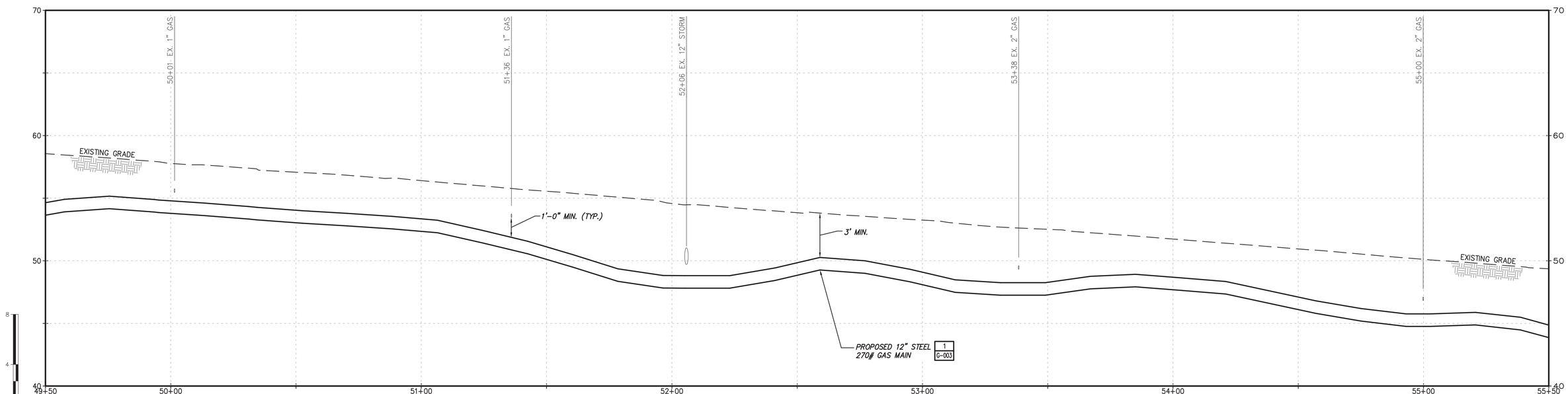
DRAWING NUMBER C-273

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

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Chkd. BCK	Design Engr. GEW	Design Supv. JEO

NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-273-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-273-29847		C-273

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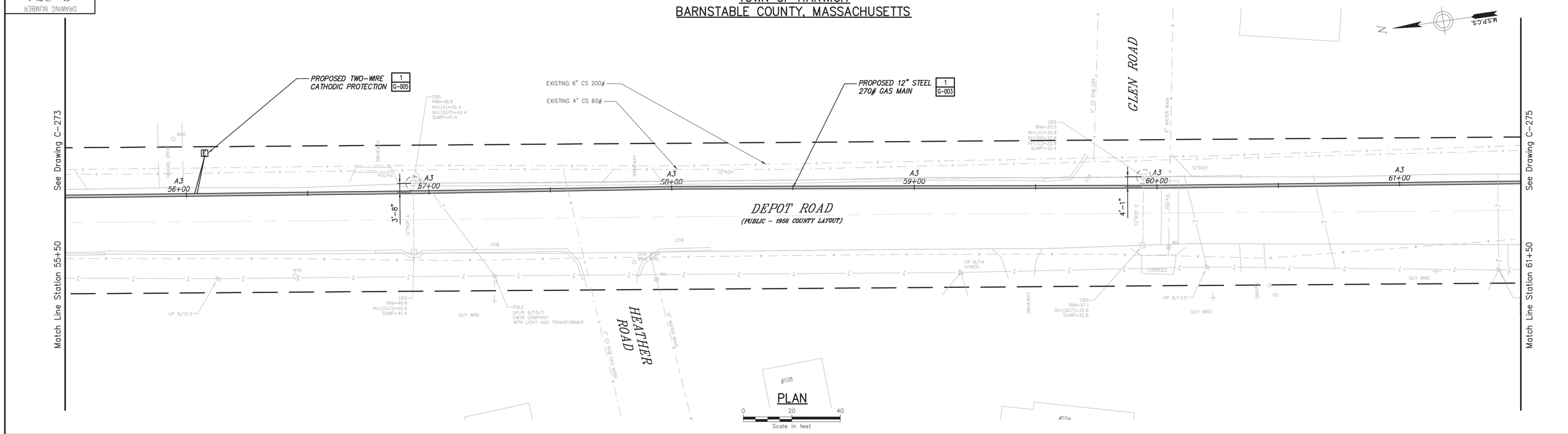
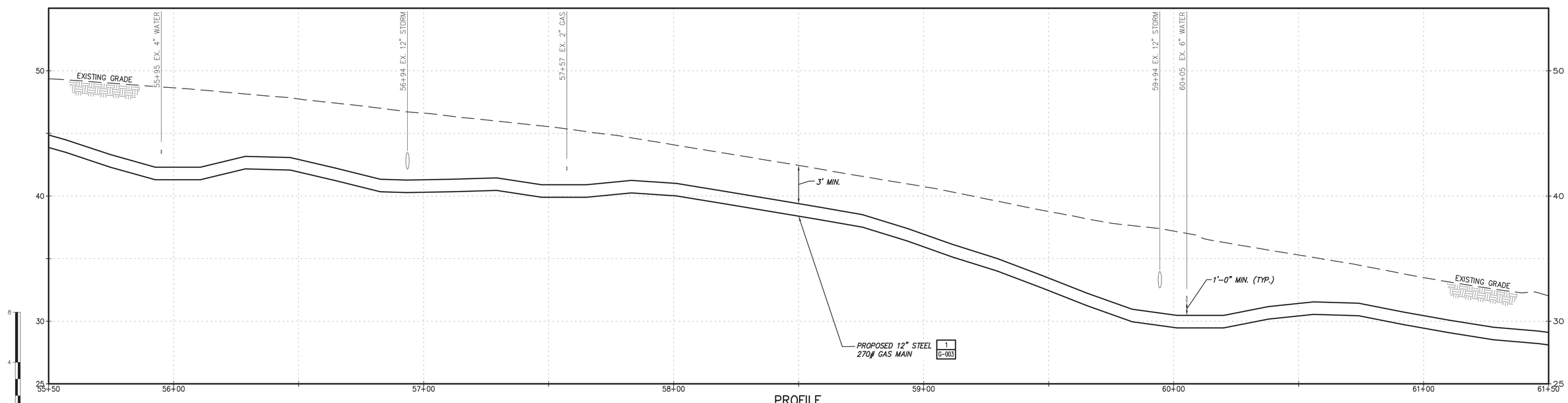
DRAWING NUMBER
C-274

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS





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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-274-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-274-29847		C-274

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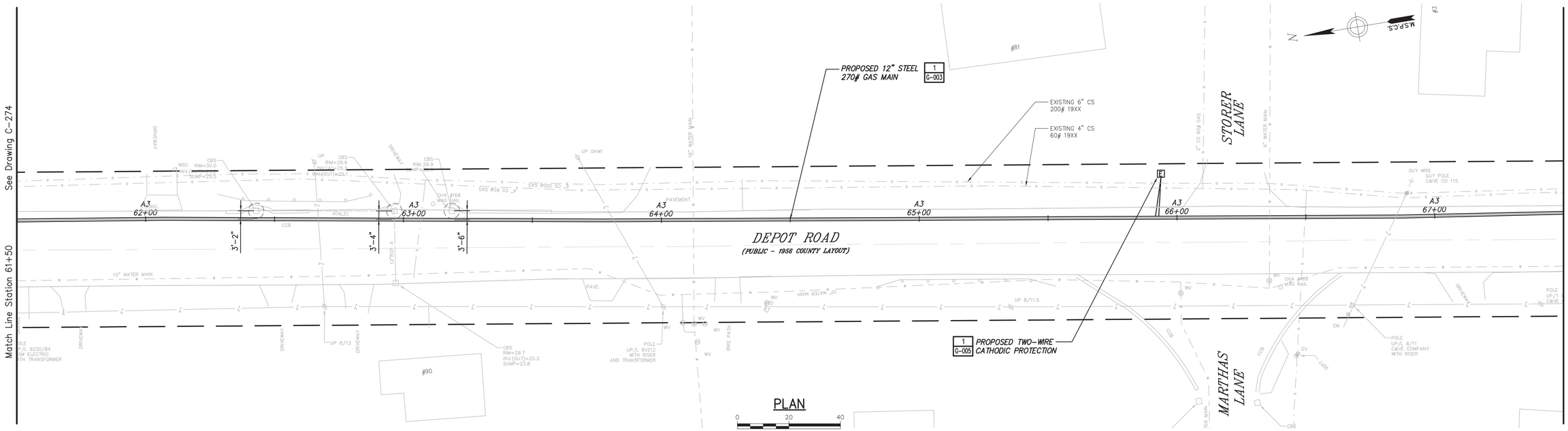
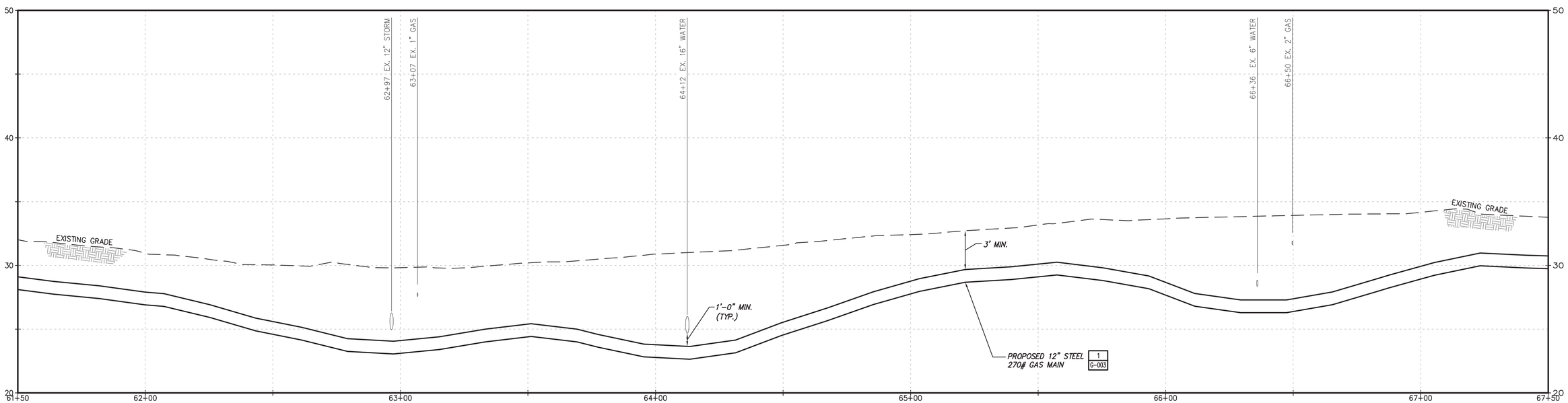
DRAWING NUMBER C-275

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-275-29847

Drawn RJT	Date 01/22/2016	Scale AS NOTED	CAD FILE NAME C-275-29847	SEQUENCE No.	DRAWING NUMBER C-275
Chkd. BCK	Design Engr. GEW	Design Supv. JEO			

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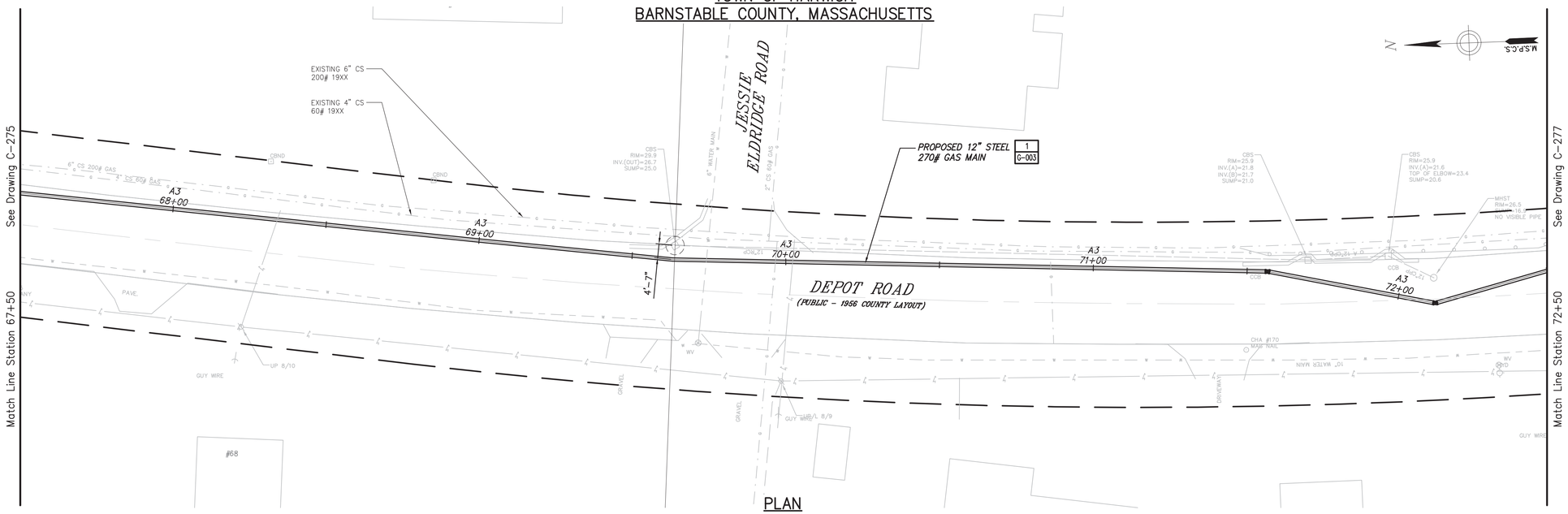
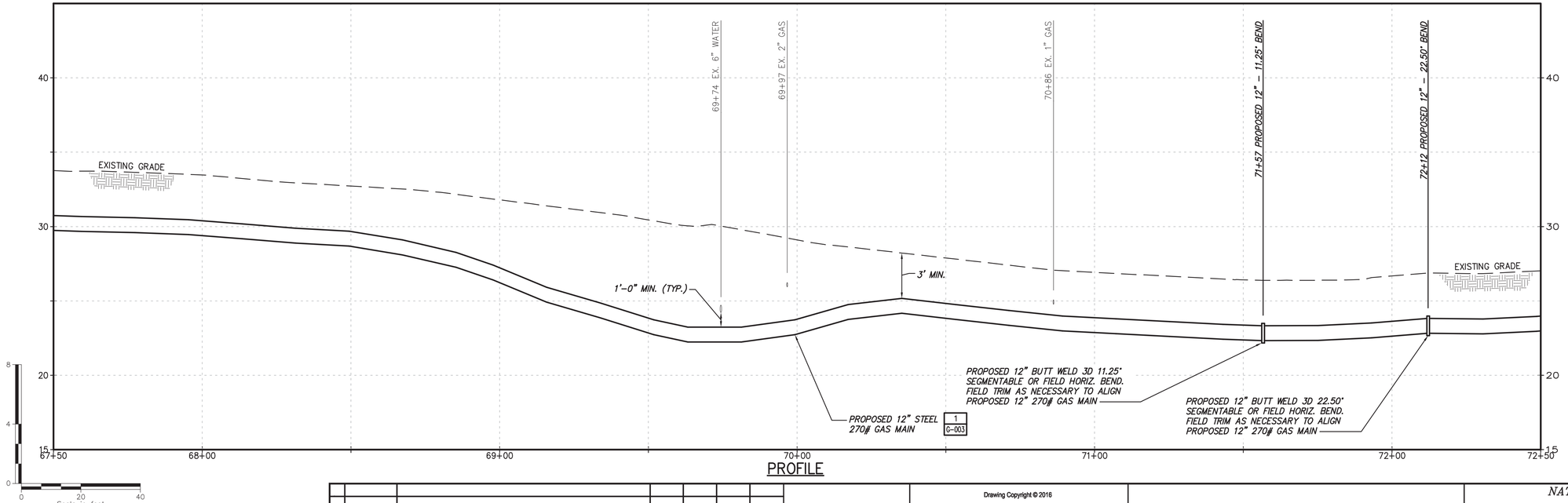
DRAWING NUMBER C-276

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-276-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-276-29847		C-276

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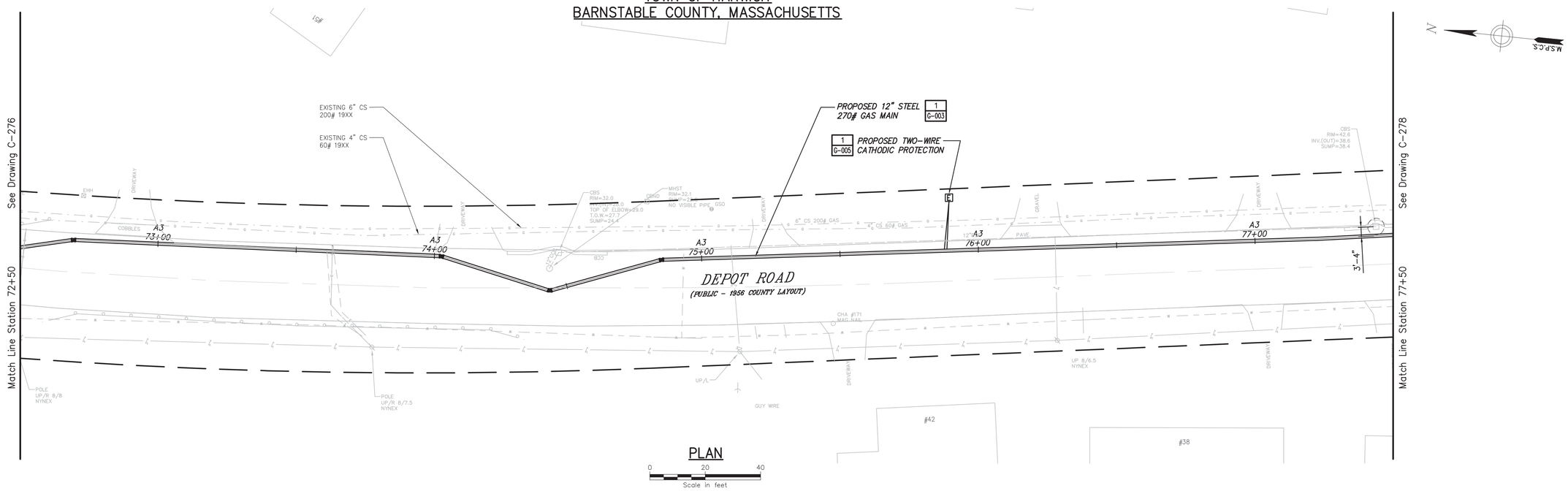
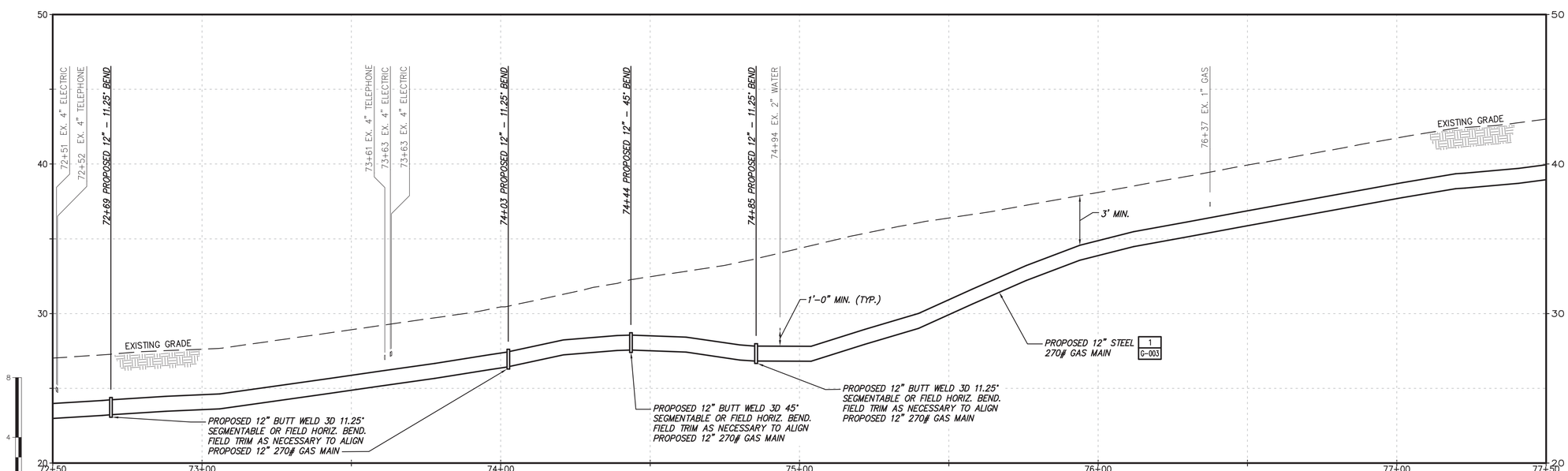
DRAWING NUMBER
C-277

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-277-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-277-29847		C-277

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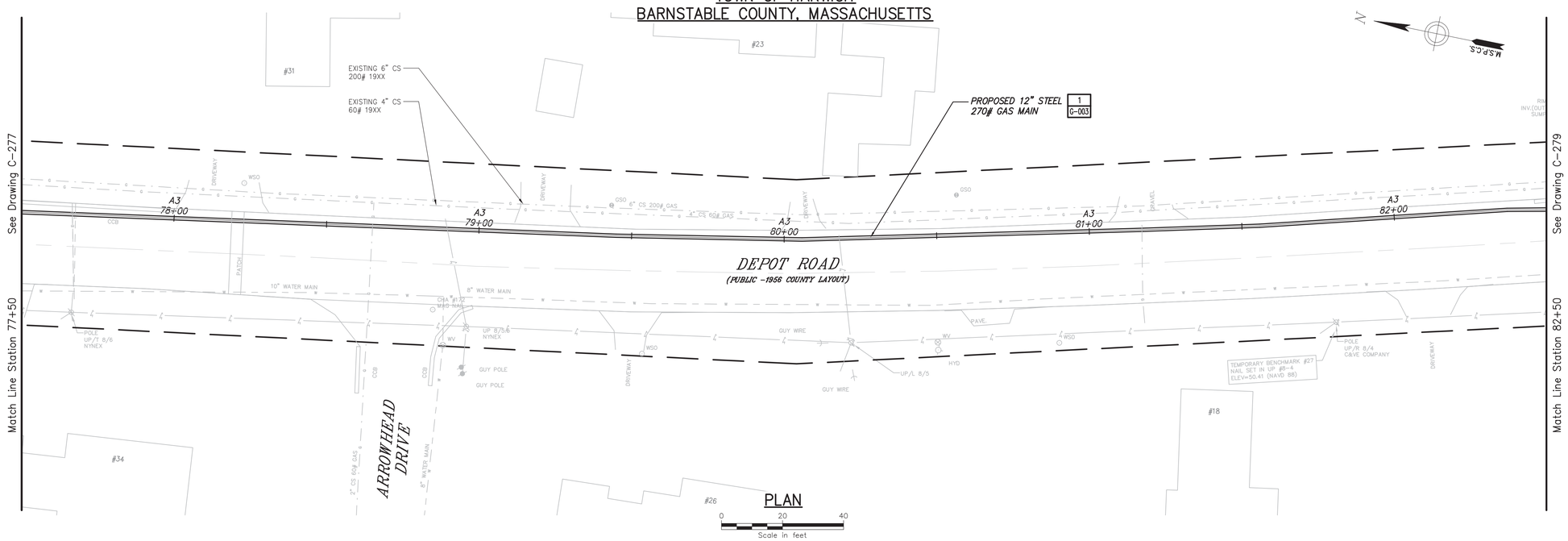
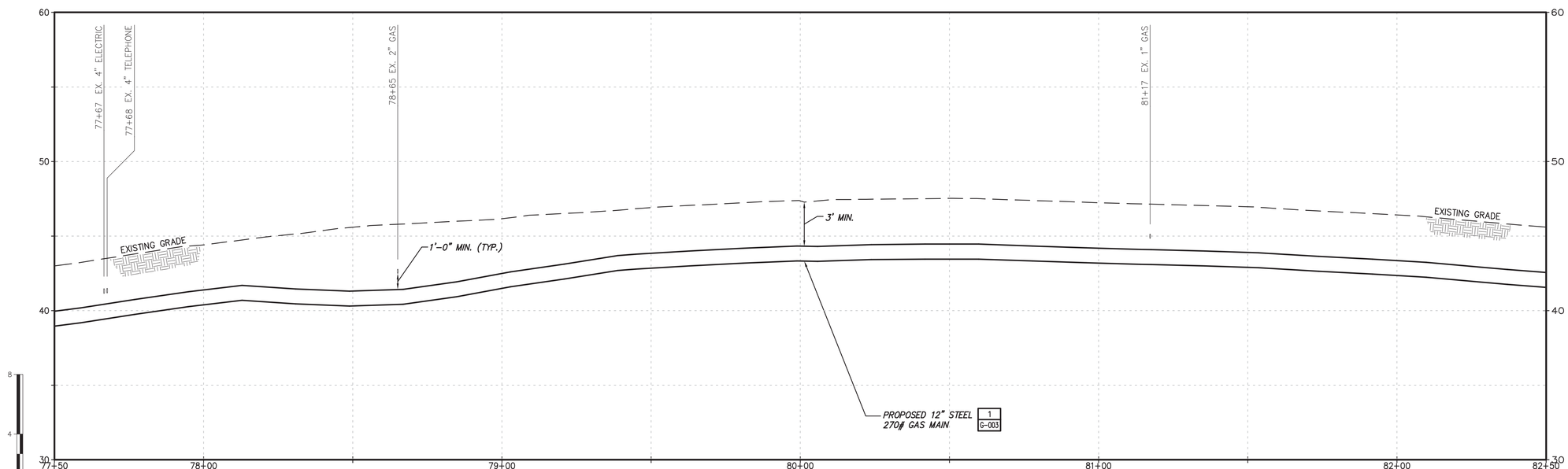
DRAWING NUMBER C-278

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

No	Date	Revision	By	Chkd.	Engr.	Supv.
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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-278-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-278-29847		C-278

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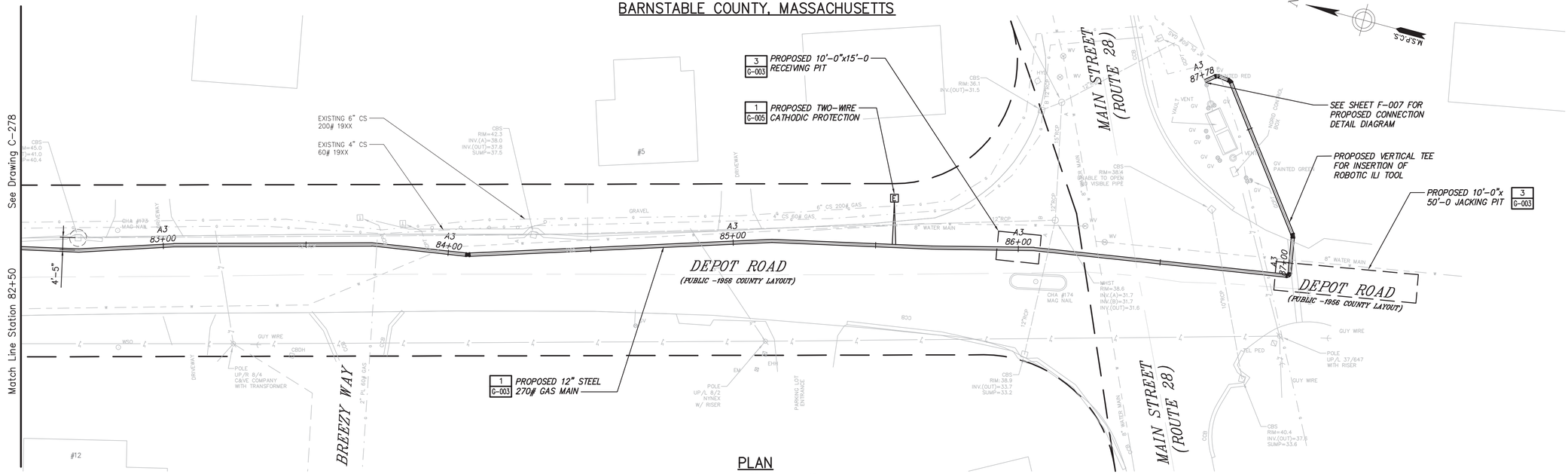
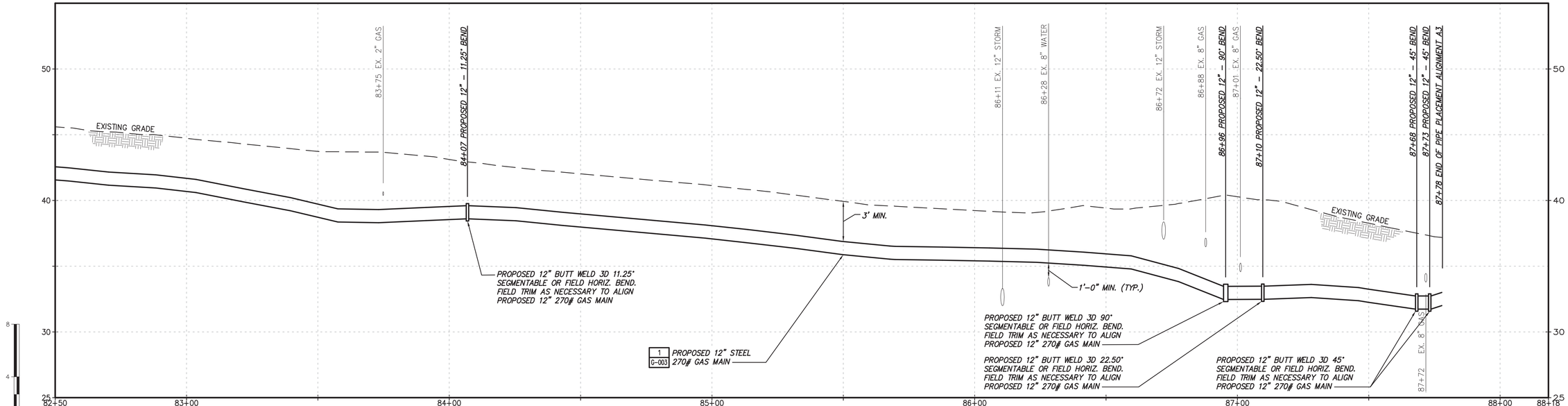
DRAWING NUMBER C-279

TOWN OF HARWICH
BARNSTABLE COUNTY, MASSACHUSETTS



PLAN

0 20 40
Scale in feet



PROFILE

0 20 40
Scale in feet

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NATIONAL GRID GAS
MID-CAPE MAIN REPLACEMENT
CONSTRUCTION DRAWINGS
C-279-29847

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
C-279-29847		C-279

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