REVIEWER NOTES

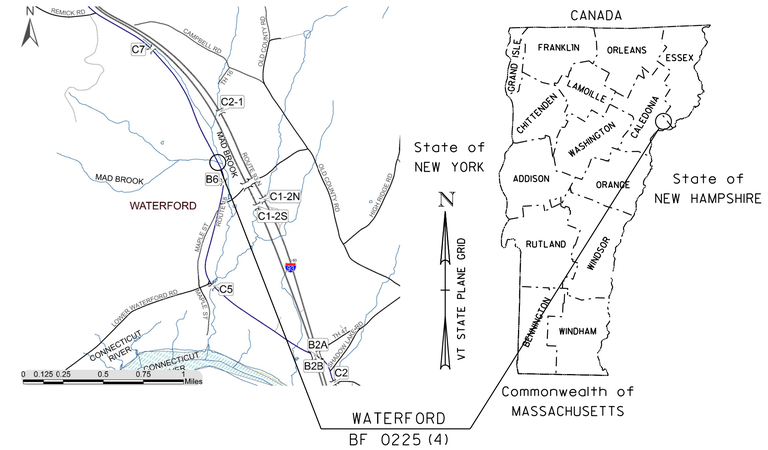
1. THE BRIDGE WILL BE CLOSED FOR ONE WEEKEND (FRIDAY 6PM-MONDAY 6AM). TRAFFIC WILL BE MAINTAINED VIA A SIGNED STATE DETOUR.

2. IT IS ANTICIPATED THAT CHANNEL RIGHTS WILL BE NECESSARY FOR THIS PROJECT. THE EXTENT OF RIGHTS REQUIRED WILL NOT BE KNOWN UNTIL FINAL DESIGN.

3. THERE ARE EXISTING OVERHEAD UTILITIES WITHIN THE PROJECT AREA WHICH WILL NOT BE RELOCATED. THE CONTRACTOR WILL BE REQUIRED TO WORK AROUND THEM.

4. A SIMPLIFIED PAVEMENT DESIGN HAS BEEN DONE FOR THIS PROJECT.

STATE OF VERMONT
AGENCY OF TRANSPORTATION



PROPOSED IMPROVEMENT
BRIDGE PROJECT

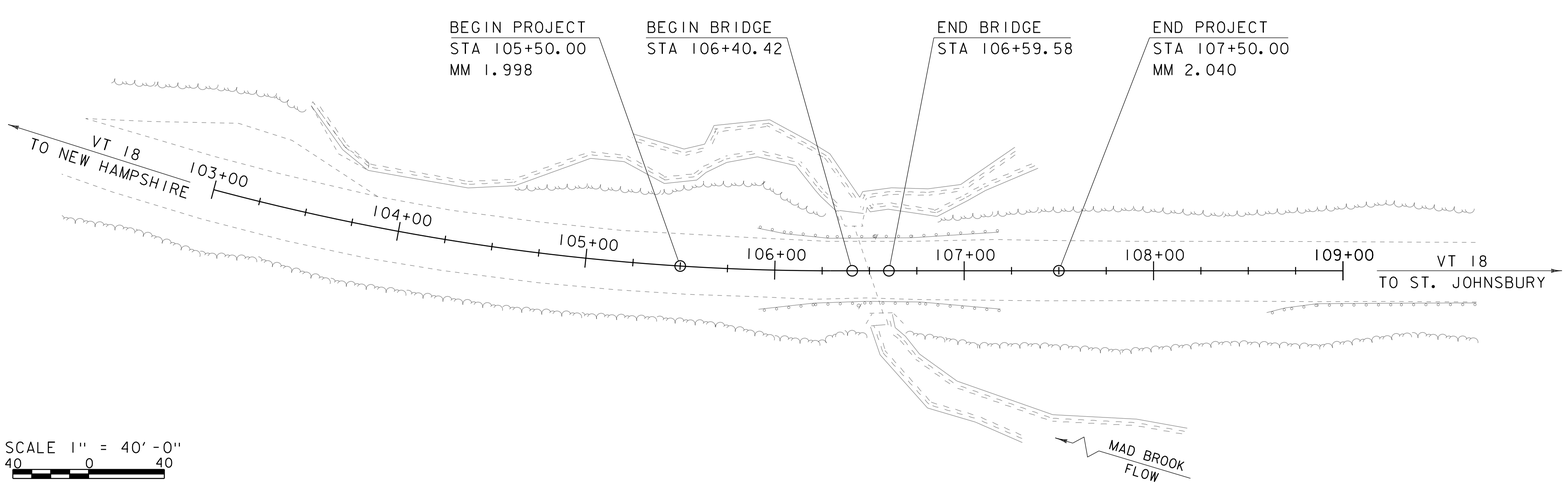
TOWN OF WATERFORD
COUNTY OF CALEDONIA

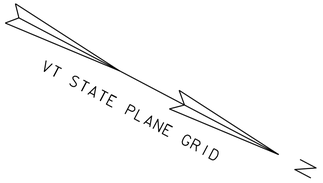
ROUTE NO : VT ROUTE 18, RURAL MAJOR COLLECTOR BRIDGE NO : 7

PROJECT LOCATION: APPROXIMATELY 5.9 MILES SOUTH OF THE JUNCTION OF VT ROUTE 18 AND US ROUTE 2

PROJECT DESCRIPTION: REMOVAL OF EXISTING BRIDGE, AND REPLACEMENT WITH A NEW STRUCTURE.

LENGTH OF STRUCTURE: 19.16 FEET
LENGTH OF ROADWAY: 180.84 FEET
LENGTH OF PROJECT: 200.00 FEET





CONCEPTUAL PLANS
30-SEP-2015

CONSTRUCTION IS TO BE CARRIED ON IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION DATED 2011, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION ON JULY 20, 2011 FOR USE ON THIS PROJECT, INCLUDING ALL SUBSEQUENT REVISIONS AND SUCH REVISED SPECIFICATIONS AND SPECIAL PROVISIONS AS ARE INCORPORATED IN THESE PLANS.

QUALITY ASSURANCE PROGRAM : LEVEL 2

SURVEYED BY : R. GILMAN
SURVEYED DATE : 12-27-2013

DATUM
VERTICAL NAVD88
HORIZONTAL NAD83 (2011)

SCALE 1" = 40'-0"
40 0 40

DIRECTOR OF PROJECT DELIVERY
APPROVED _____ DATE _____

PROJECT MANAGER : K. HIGGINS

PROJECT NAME : WATERFORD
PROJECT NUMBER : BF 0225 (4)

SHEET 1 OF 17 SHEETS

STATE OF VERMONT
AGENCY OF TRANSPORTATION

PRELIMINARY INFORMATION SHEET (CULVERT)

Version
LRFD

INDEX OF SHEETS

PLAN SHEETS

1	TITLE SHEET
2	PRELIMINARY INFORMATION SHEET
3	TYPICAL SECTIONS
4	SYMBOLOGY LEGEND
5	EXISTING CONDITIONS
6	LAYOUT SHEET
7	MAINLINE PROFILE
8 - 11	MAINLINE SECTIONS
12 - 14	CHANNEL SECTIONS

STANDARDS LIST

FINAL HYDRAULIC REPORT

TRAFFIC MAINTENANCE NOTES

1. MAINTAIN TRAFFIC ON AN OFF SITE DETOUR.
2. TRAFFIC SIGNALS ARE NOT NECESSARY.
3. SIDEWALKS ARE NOT NECESSARY

DESIGN VALUES

1. DESIGN LIVE LOAD		HL-93
2. FUTURE PAVEMENT	d_p:	3.0 INCH
3. CULVERT OPENING	D:	16.00 FT
4. MIN. MID-SPAN POS. CAMBER @ RELEASE (PRESTRESSED UNITS)	Δ:	- - -
5. PRESTRESSING STRAND	f_y:	- - -
6. PRESTRESSED CONCRETE STRENGTH	f'_c:	- - -
7. PRESTRESSED CONCRETE RELEASE STRENGTH	f'_{ci}:	- - -
8. CONCRETE, HIGH PERFORMANCE CLASS AA	f'_c:	4.0 KSI
9. CONCRETE, HIGH PERFORMANCE CLASS A	f'_c:	4.0 KSI
10. CONCRETE, HIGH PERFORMANCE CLASS B	f'_c:	3.5 KSI
11. CONCRETE, CLASS C	f'_c:	3.0 KSI
12. REINFORCING STEEL	f_y:	60 KSI
13. STRUCTURAL STEEL AASHTO M270	f_y:	- - -
14. NOMINAL BEARING RESISTANCE OF SOIL	q_n:	4.0 KSF
15. SOIL BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	ϕ:	- - -
16. NOMINAL BEARING RESISTANCE OF ROCK	q_n:	10.0 KSF
17. ROCK BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	ϕ:	- - -
18. PILE RESISTANCE FACTOR	ϕ:	- - -
19. LATERAL PILE DEFLECTION	Δ:	- - -
20. BASIC WIND SPEED	V_{3s}:	- - -
21. MINIMUM GROUND SNOW LOAD	p_g:	- - -
22. SEISMIC DATA PGA: 0	S_s:	- - -
	S_1:	- - -
23.		
24.		- - -
25.		- - -
26.		- - -

LRFR LOAD RATING FACTORS

LOADING LEVELS	TRUCK						
	H-20	HL-93	3S2	6 AXLE	3A. STR.	4A. STR.	5A. SEMI
TONNAGE	20	36	36	66	30	34.5	38
INVENTORY							
POSTING							
OPERATING							
COMMENTS:	TABLE TO BE COMPLETED BY CONTRACTOR'S DESIGNER						

AS BUILT "REBAR" DETAIL

LEVEL I	LEVEL II	LEVEL III
TYPE:	TYPE:	TYPE:
GRADE:	GRADE:	GRADE:

CULVERT DESIGN CRITERIA

1. PROPOSED CULVERT IS A PRECAST CONCRETE STRUCTURE (16'-0" x 8'-0" x 50'-0")
2. CULVERT ENDS ARE NOT SKEWED.
3. CULVERT WILL BE SET AT A SLOPE OF 20.16 IN. ON 52 FT.
4. CULVERT WILL REQUIRE AQUATIC ORGANISM PASSAGE ACCOMODATIONS
5. CULVERT CONSTRUCTION WILL NOT REQUIRE A TEMPORARY PIPE

TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT
2017	1200	140	58	27.3	280
2037	1200	140	58	37.1	380

20 year ESAL for flexible pavement from 2017 to 2037 : 1938000

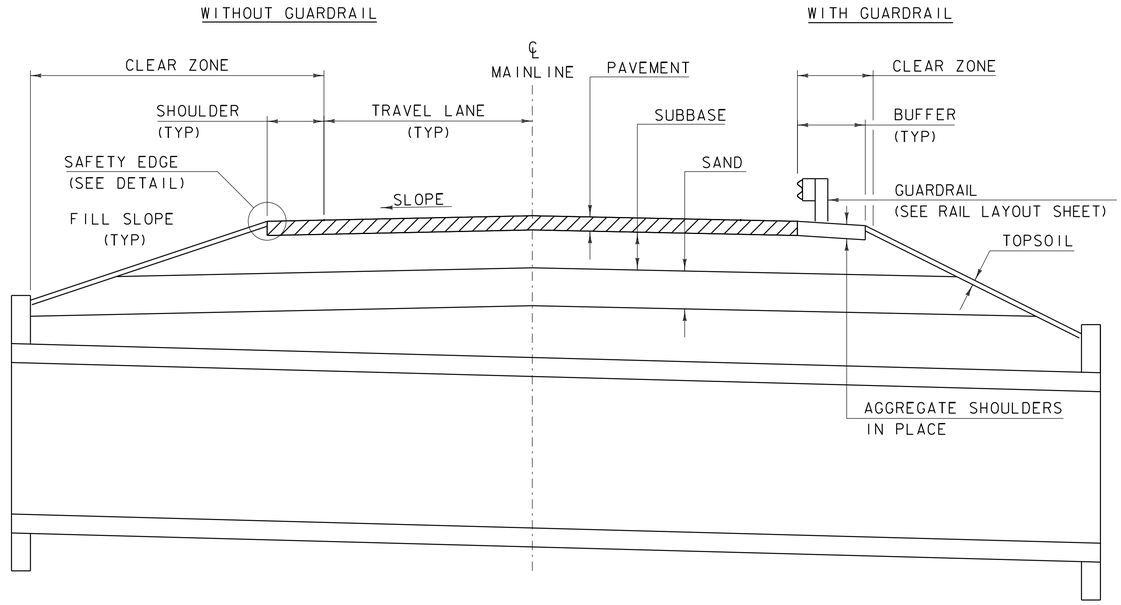
40 year ESAL for flexible pavement from 2017 to 2057 : 4423000

Design Speed : 50 mph

PROJECT NAME: **WATERFORD**

PROJECT NUMBER: **BF 0225(4)**

FILE NAME:	s13c268pi.dgn	PLOT DATE:	3/4/2015
PROJECT LEADER:	K. HIGGINS	DRAWN BY:	D. BEARD
DESIGNED BY:	J. SALVATORI	CHECKED BY:	J. SALVATORI
PRELIMINARY INFORMATION SHEET		SHEET	2 OF 14



ROADWAY TYPICAL SECTION

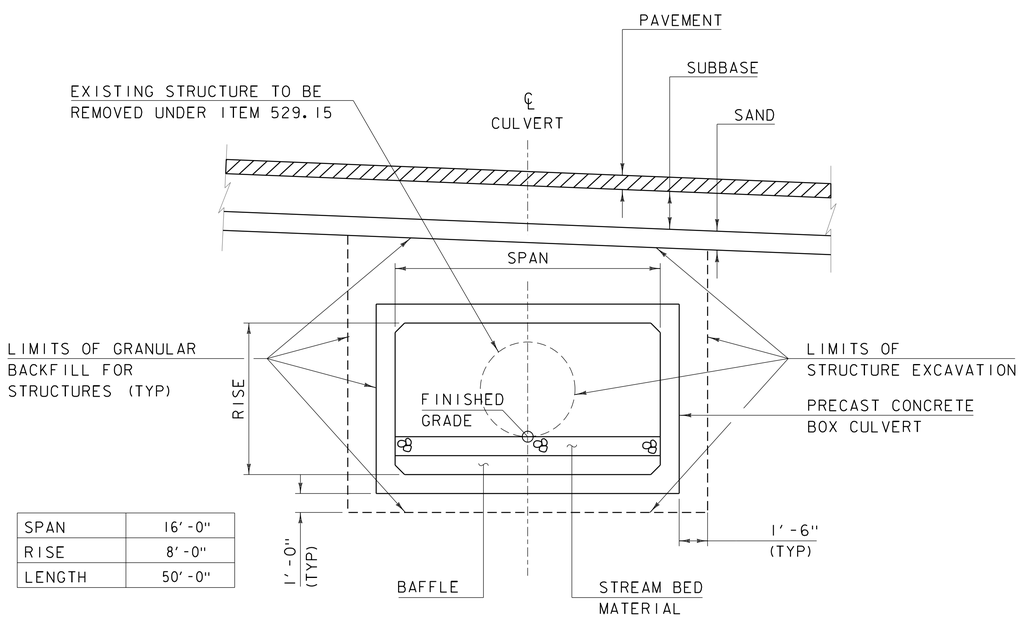
NOT TO SCALE

MATERIAL INFORMATION

	THICKNESS	TYPE
WEARING COURSE	1½"	BITUMINOUS CONCRETE PAVEMENT TYPE IV
BINDER COURSE	1½"	BITUMINOUS CONCRETE PAVEMENT TYPE IV
BASE COURSE #2	N/A	N/A
BASE COURSE #1	3½"	BITUMINOUS CONCRETE PAVEMENT TYPE II
SUBBASE	24"	SUBBASE OF DENSE GRADED CRUSHED STONE
SAND	12"	SAND BORROW
STONE FILL	3'-0"	STONE FILL, TYPE III
TOPSOIL	4"	TOPSOIL
STREAM BED MATERIAL		SPECIAL PROVISION (STONE FILL, STREAM BED MATERIAL) (TYPE II)

ROAD TYPICAL INFORMATION

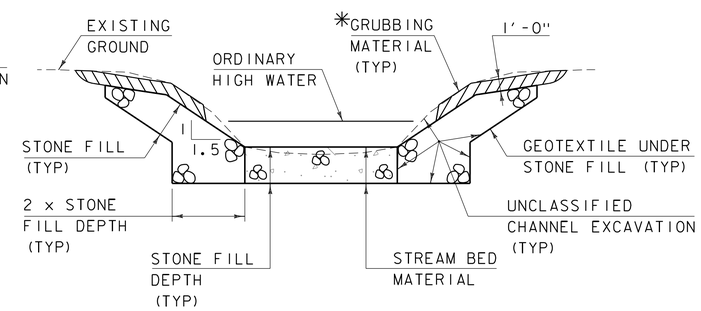
	LEFT		RIGHT	
	WIDTH	SLOPE	WIDTH	SLOPE
TRAVEL LANE	12'-0"	VARIES	12'-0"	VARIES
SHOULDER	4'-0"	VARIES	4'-0"	VARIES
BUFFER	3'-7"	-0.060	3'-7"	-0.060
FILL SLOPE		1:2.0		1:2.0
CLEAR ZONE (CUT)	12'-0"		12'-0"	
CLEAR ZONE (FILL)	16'-0"		16'-0"	
CLEAR ZONE (GUARDRAIL)	4'-0"		4'-0"	



SPAN	16'-0"
RISE	8'-0"
LENGTH	50'-0"

CULVERT TYPICAL SECTION

NOT TO SCALE



CHANNEL TYPICAL SECTION

NOT TO SCALE

* WHENEVER CHANNEL SLOPE INTERSECTS ROADWAY SUBBASE, GRUBBING MATERIAL SHALL BEGIN AT THE BOTTOM OF SUBBASE.

MATERIAL TOLERANCES

(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- ¼"
- AGGREGATE SURFACE COURSE	+/- ½"
SUBBASE	+/- 1"
SAND BORROWS	+/- 1"

PROJECT NAME: WATERFORD
PROJECT NUMBER: BF 0225(4)

FILE NAME: 13c268/sl3c268typical.dgn
PROJECT LEADER: K.HIGGINS
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 30-SEP-2015
DRAWN BY: D.D.BEARD
CHECKED BY: J.SALVATORI
SHEET 3 OF 17

GENERAL INFORMATION

SYMBOLOGY LEGEND NOTE

THE SYMBOLOGY ON THIS SHEET IS INTENDED TO COVER STANDARD CONVENTIONAL SYMBOLOGY. THE SYMBOLOGY IS USED FOR EXISTING & PROPOSED FEATURES WITH HEAVIER LINEWEIGHT, IN COMBINATION WITH PROJECT ANNOTATION, AS NOTED ON PROJECT PLAN SHEETS. THIS LEGEND SHEET COVERS THE BASICS. SYMBOLOGY ON PLANS MAY VARY, PLAN ANNOTATIONS AND NOTES SHOULD BE USED TO CLARIFY AS NEEDED.

R.O.W. ABBREVIATIONS (CODES) & SYMBOLS

POINT	CODE	DESCRIPTION
	CH	CHANNEL EASEMENT
	CONST	CONSTRUCTION EASEMENT
	CUL	CULVERT EASEMENT
	D&C	DISCONNECT & CONNECT
	DIT	DITCH EASEMENT
	DR	DRAINAGE EASEMENT
	DRIVE	DRIVEWAY EASEMENT
	EC	EROSION CONTROL
	HWY	HIGHWAY EASEMENT
	I&M	INSTALL & MAINTAIN EASEMENT
	LAND	LANDSCAPE EASEMENT
	R&RES	REMOVE & RESET
	R&REP	REMOVE & REPLACE
	SR	SLOPE RIGHT
	UE	UTILITY EASEMENT
	(P)	PERMANENT EASEMENT
	(T)	TEMPORARY EASEMENT
■	BNDNS	BOUND SET
▣	BNDNS	BOUND TO BE SET
●	IPNS	IRON PIN SET
◎	IPNS	IRON PIN TO BE SET
⊠	CALC	EXISTING ROW POINT
○	PROW	PROPOSED ROW POINT
[LENGTH]		LENGTH CARRIED ON NEXT SHEET

COMMON TOPOGRAPHIC POINT SYMBOLS

POINT	CODE	DESCRIPTION
	APL	BOUND APPARENT LOCATION
	BM	BENCHMARK
	BND	BOUND
	CB	CATCH BASIN
	COMB	COMBINATION POLE
	DITHR	DROP INLET THROATED DNC
	EL	ELECTRIC POWER POLE
	FPOLE	FLAGPOLE
	GASFIL	GAS FILLER
	GP	GUIDE POST
	GSO	GAS SHUT OFF
	GUY	GUY POLE
	GUYW	GUY WIRE
	GV	GATE VALUE
	H	TREE HARDWOOD
	HCTRL	CONTROL HORIZONTAL
	HVCTRL	CONTROL HORIZ. & VERTICAL
	HYD	HYDRANT
	IP	IRON PIN
	IPIPE	IRON PIPE
	LI	LIGHT - STREET OR YARD
	MB	MAILBOX
	MH	MANHOLE (MH)
	MM	MILE MARKER
	PM	PARKING METER
	PMK	PROJECT MARKER
	POST	POST STONE/WOOD
	RRSIG	RAILROAD SIGNAL
	RRSL	RAILROAD SWITCH LEVER
	S	TREE SOFTWOOD
	SAT	SATELLITE DISH
	SHRUB	SHRUB
	SIGN	SIGN
	STUMP	STUMP
	TEL	TELEPHONE POLE
	TIE	TIE
	TSIGN	SIGN W/DOUBLE POST
	VCTRL	CONTROL VERTICAL
	WELL	WELL
	WSO	WATER SHUT OFF

THESE ARE COMMON VAOT SURVEY POINT SYMBOLS FOR EXISTING FEATURES, ALSO USED FOR PROPOSED FEATURES WITH HEAVIER LINEWEIGHT, IN COMBINATION WITH PROPOSED ANNOTATION.

PROPOSED GEOMETRY CODES

CODE	DESCRIPTION
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
CC	CENTER OF CURVE
PT	POINT OF TANGENCY
PCC	POINT OF COMPOUND CURVE
PRC	POINT OF REVERSE CURVE
POB	POINT OF BEGINNING
POE	POINT OF ENDING
STA	STATION PREFIX
AH	AHEAD STATION SUFFIX
BK	BACK STATION SUFFIX
D	CURVE DEGREE OF (100FT)
R	CURVE RADUIS OF
T	CURVE TANGENT LENGTH
L	CURVE LENGTH OF
E	CURVE EXTERNAL DISTANCE

UTILITY SYMBOLOGY

UNDERGROUND UTILITIES

UGU	UTILITY (GENERIC-UNKNOWN)
UT	TELEPHONE
UE	ELECTRIC
UC	CABLE (TV)
UEC	ELECTRIC+CABLE
UET	ELECTRIC+TELEPHONE
UCT	CABLE+TELEPHONE
UECT	ELECTRIC+CABLE+TELEP.
G	GAS LINE
W	WATER LINE
S	SANITARY SEWER (SEPTIC)

ABOVE GROUND UTILITIES (AERIAL)

AGU	UTILITY (GENERIC-UNKNOWN)
T	TELEPHONE
E	ELECTRIC
C	CABLE (TV)
EC	ELECTRIC+CABLE
ET	ELECTRIC+TELEPHONE
AER E&T	ELECTRIC+TELEPHONE
CT	CABLE+TELEPHONE
ECT	ELECTRIC+CABLE+TELEP.
	UTILITY POLE GUY WIRE

PROJECT CONSTRUCTION SYMBOLOGY

PROJECT DESIGN & LAYOUT SYMBOLOGY

CZ	CLEAR ZONE
	PLAN LAYOUT MATCHLINE

PROJECT CONSTRUCTION FEATURES

	TOP OF CUT SLOPE
	TOE OF FILL SLOPE
	STONE FILL
	BOTTOM OF DITCH ℄
	CULVERT PROPOSED
	STRUCTURE SUBSURFACE
PDF	PROJECT DEMARCATION FENCE
BF	BARRIER FENCE
	TREE PROTECTION ZONE (TPZ)
	STRIPING LINE REMOVAL
	SHEET PILES

CONVENTIONAL BOUNDARY SYMBOLOGY

BOUNDARY LINES

TOWN LINE	TOWN BOUNDARY LINE
COUNTY LINE	COUNTY BOUNDARY LINE
STATE LINE	STATE BOUNDARY LINE
	PROPOSED STATE R.O.W. (LIMITED ACCESS)
	PROPOSED STATE R.O.W.
	STATE ROW (LIMITED ACCESS)
	STATE ROW
	TOWN ROW
	PERMANENT EASEMENT LINE (P)
	TEMPORARY EASEMENT LINE (T)
	SURVEY LINE
P/L	PROPERTY LINE (P/L)
SR	SLOPE RIGHTS
6f	6F PROPERTY BOUNDARY
4f	4F PROPERTY BOUNDARY
HAZ	HAZARDOUS WASTE

EPSC LAYOUT PLAN SYMBOLOGY

EPSC MEASURES

	FILTER CURTAIN
	SILT FENCE
	SILT FENCE WOVEN WIRE
	CHECK DAM
	DISTURBED AREAS REQUIRING RE-VEGETATION
	EROSION MATTING

SEE EPSC DETAIL SHEETS FOR ADDITIONAL SYMBOLOGY

ENVIRONMENTAL RESOURCES

	WETLAND BOUNDARY
	RIPARIAN BUFFER ZONE
	WETLAND BUFFER ZONE
	SOIL TYPE BOUNDARY
T&E	THREATENED & ENDANGERED SPECIES
HAZ	HAZARDOUS WASTE AREA
AG	AGRICULTURAL LAND
HABITAT	FISH & WILDLIFE HABITAT
FLOOD PLAIN	FLOOD PLAIN
OHW	ORDINARY HIGH WATER (OHW)
	STORM WATER
	USDA FOREST SERVICE LANDS
	WILDLIFE HABITAT SUIT/CONN

ARCHEOLOGICAL & HISTORIC

ARCH	ARCHEOLOGICAL BOUNDARY
HISTORIC DIST	HISTORIC DISTRICT BOUNDARY
HISTORIC	HISTORIC AREA
H	HISTORIC STRUCTURE

CONVENTIONAL TOPOGRAPHIC SYMBOLOGY

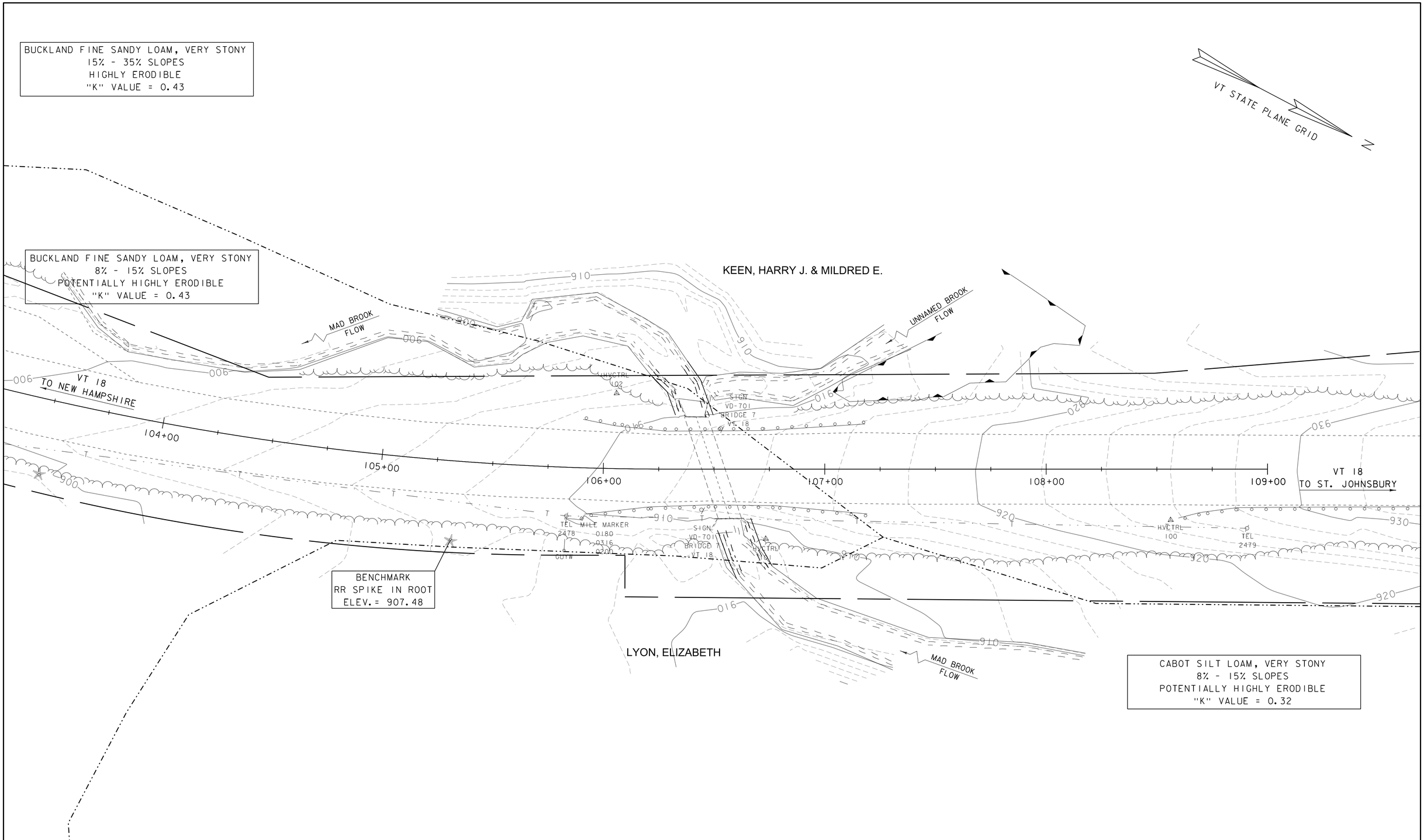
EXISTING FEATURES

	ROAD EDGE PAVEMENT
	ROAD EDGE GRAVEL
	DRIVEWAY EDGE
	DITCH
	FOUNDATION
	FENCE (EXISTING)
	FENCE WOOD POST
	FENCE STEEL POST
	GARDEN
	ROAD GUARDRAIL
	RAILROAD TRACKS
	CULVERT (EXISTING)
	STONE WALL
	WALL
	WOOD LINE
	BRUSH LINE
	HEDGE
	BODY OF WATER EDGE
	LEDGE EXPOSED

PROJECT NAME: WATERFORD
PROJECT NUMBER: BF 0225(4)

FILE NAME: sl3c268leg.dgn
PROJECT LEADER: K.HIGGINS
DESIGNED BY: ------
SYMBOLOGY LEGEND

PLOT DATE: 30-SEP-2015
DRAWN BY: M.LONGSTREET
CHECKED BY: ------
SHEET 4 OF 17



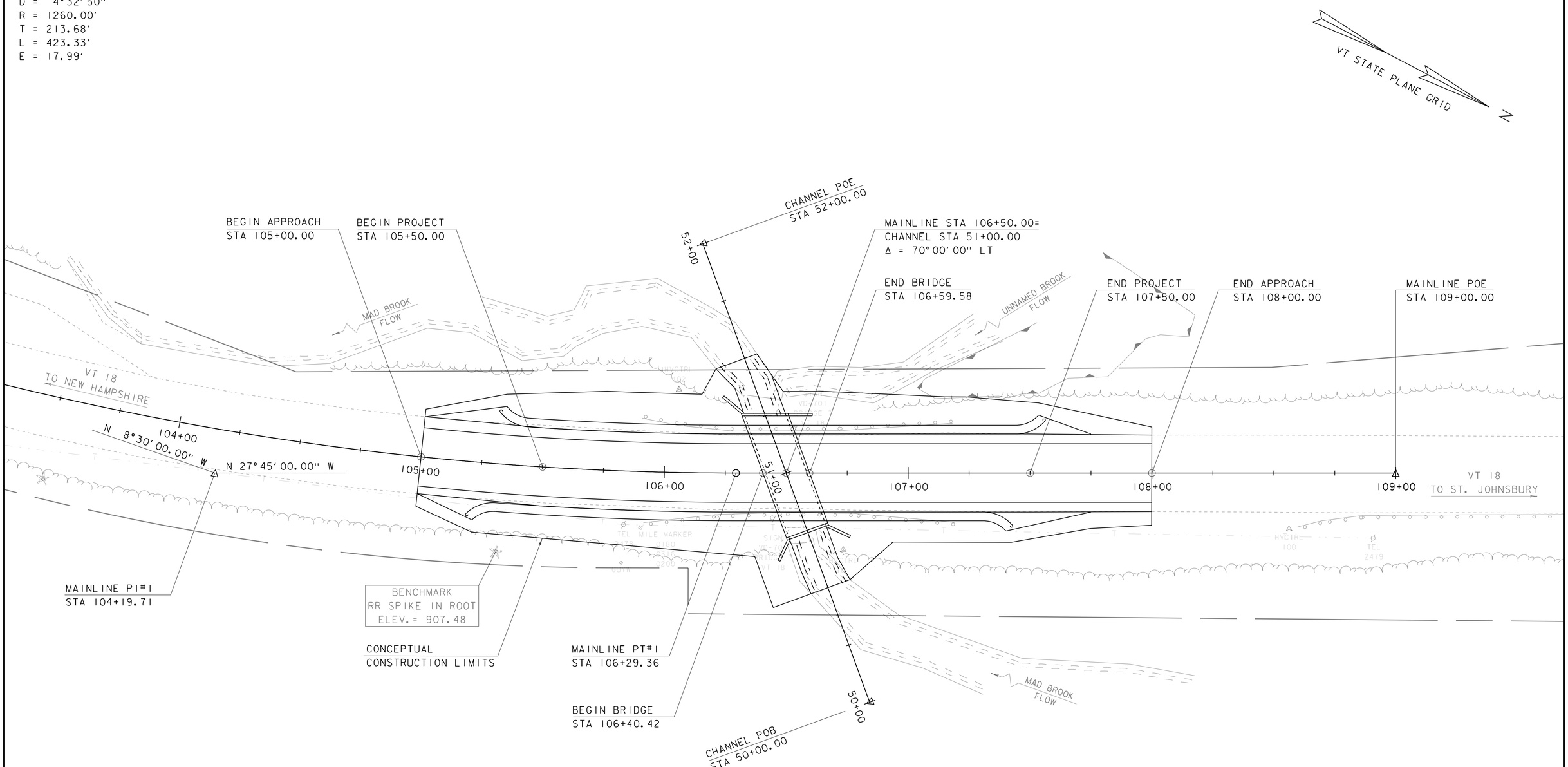
EXISTING BRIDGE DATA
SLAB BRIDGE WIDENED WITH BOX CULVERT
LENGTH = 12 FT
WIDTH = 32 FT CURB TO CURB
BUILT IN 1938

EXISTING CONDITIONS

SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268bdr_ex.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K. HIGGINS	DRAWN BY: D. BEARD
DESIGNED BY: J. SALVATORI	CHECKED BY: J. SALVATORI
EXISTING CONDITIONS	SHEET 5 OF 17

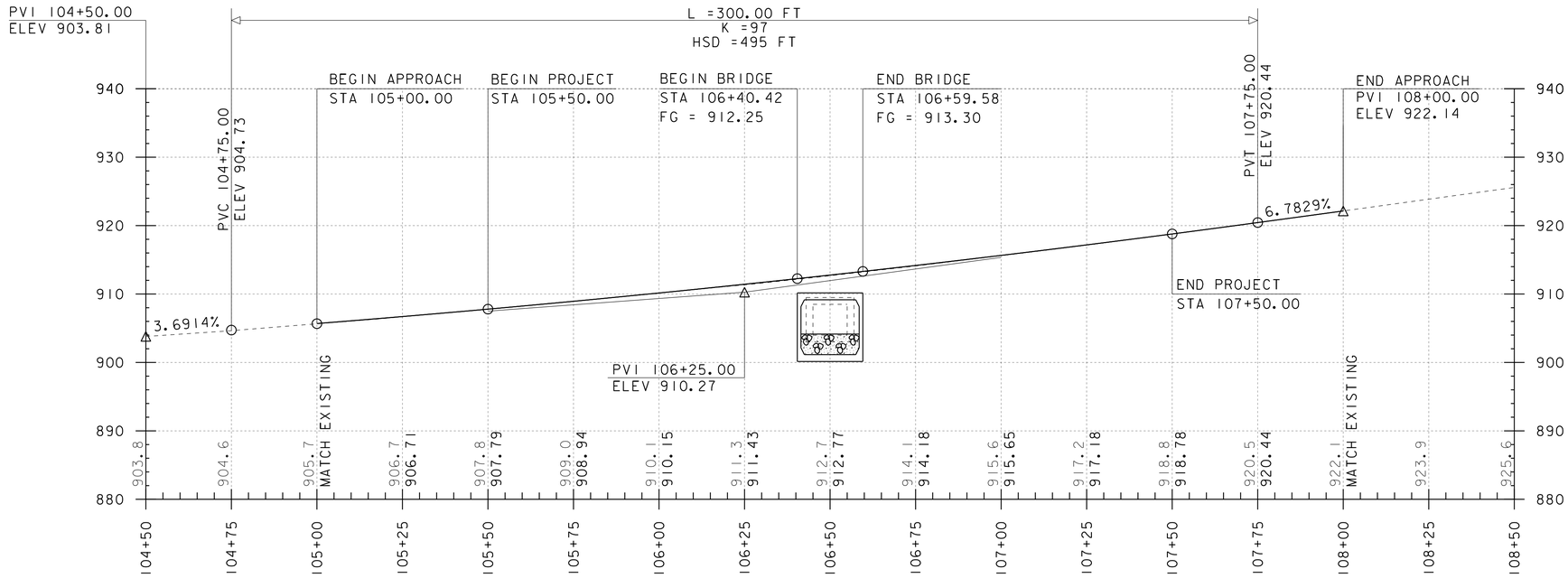
MAINLINE CURVE #1
DELTA = 19° 15′ 00″
D = 4° 32′ 50″
R = 1260.00′
T = 213.68′
L = 423.33′
E = 17.99′



LAYOUT SHEET

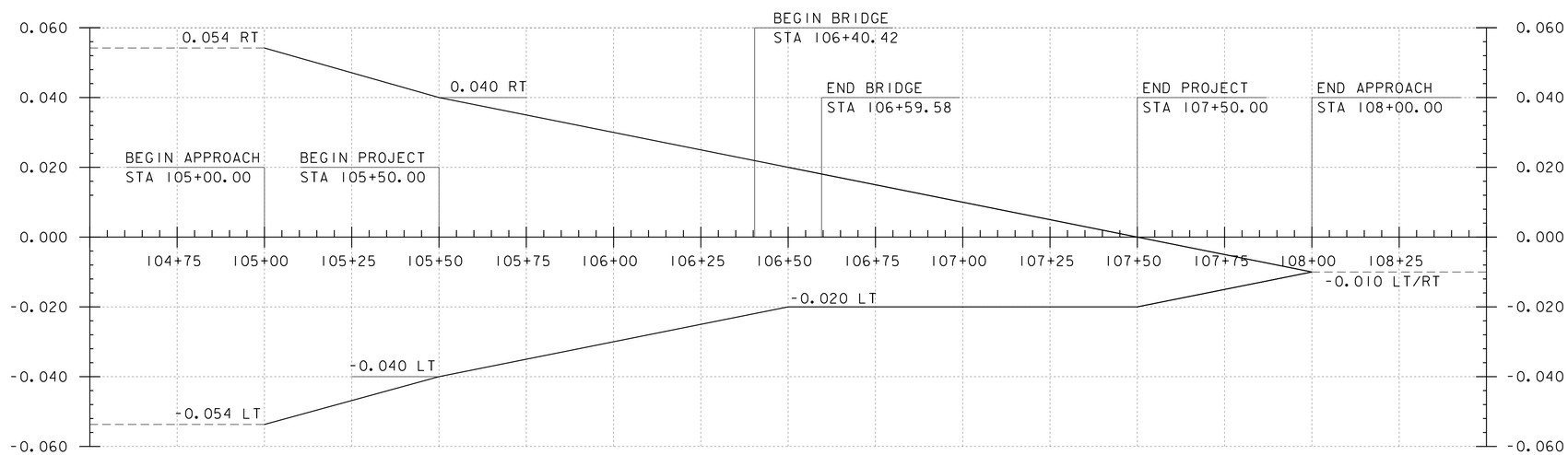
SCALE 1″ = 20′-0″
20 0 20

PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: s13c268bdr.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
LAYOUT SHEET	SHEET 6 OF 17



MAINLINE PROFILE

HOR. SCALE 1" = 20'-0"
VER. SCALE 1" = 10'-0"



BANKING DIAGRAM

HOR. SCALE 1" = 20'-0"
NO VER. SCALE

THE GRADES SHOWN TO THE NEAREST TENTH ARE THE ORIGINAL GROUND ELEVATIONS ALONG THE PROPOSED ALIGNMENT.

THE GRADES SHOWN TO THE NEAREST HUNDREDTH ARE THE FINISH GRADES ALONG THE PROPOSED ALIGNMENT.

PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268pro.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
MAINLINE PROFILE	SHEET 7 OF 17

SOIL CLASSIFICATION

AASHTO	
A1	Gravel and Sand
A3	Fine Sand
A2	Silty or Clayey Gravel and Sand
A4	Silty Soil - Low Compressibility
A5	Silty Soil - Highly Compressible
A6	Clayey Soil - Low Compressibility
A7	Clayey Soil - Highly Compressible

ROCK QUALITY DESIGNATION

R.Q.D. (%)	ROCK DESCRIPTION
<25	Very Poor
25 to 50	Poor
51 to 75	Fair
76 to 90	Good
>90	Excellent

SHEAR STRENGTH

UNDRAINED SHEAR STRENGTH IN P.S.F.	CONSISTENCY
<250	Very Soft
250-500	Soft
500-1000	Med. Stiff
1000-2000	Stiff
2000-4000	Very Stiff
>4000	Hard

CORRELATION GUIDE OF "N" TO DENSITY/CONSISTENCY

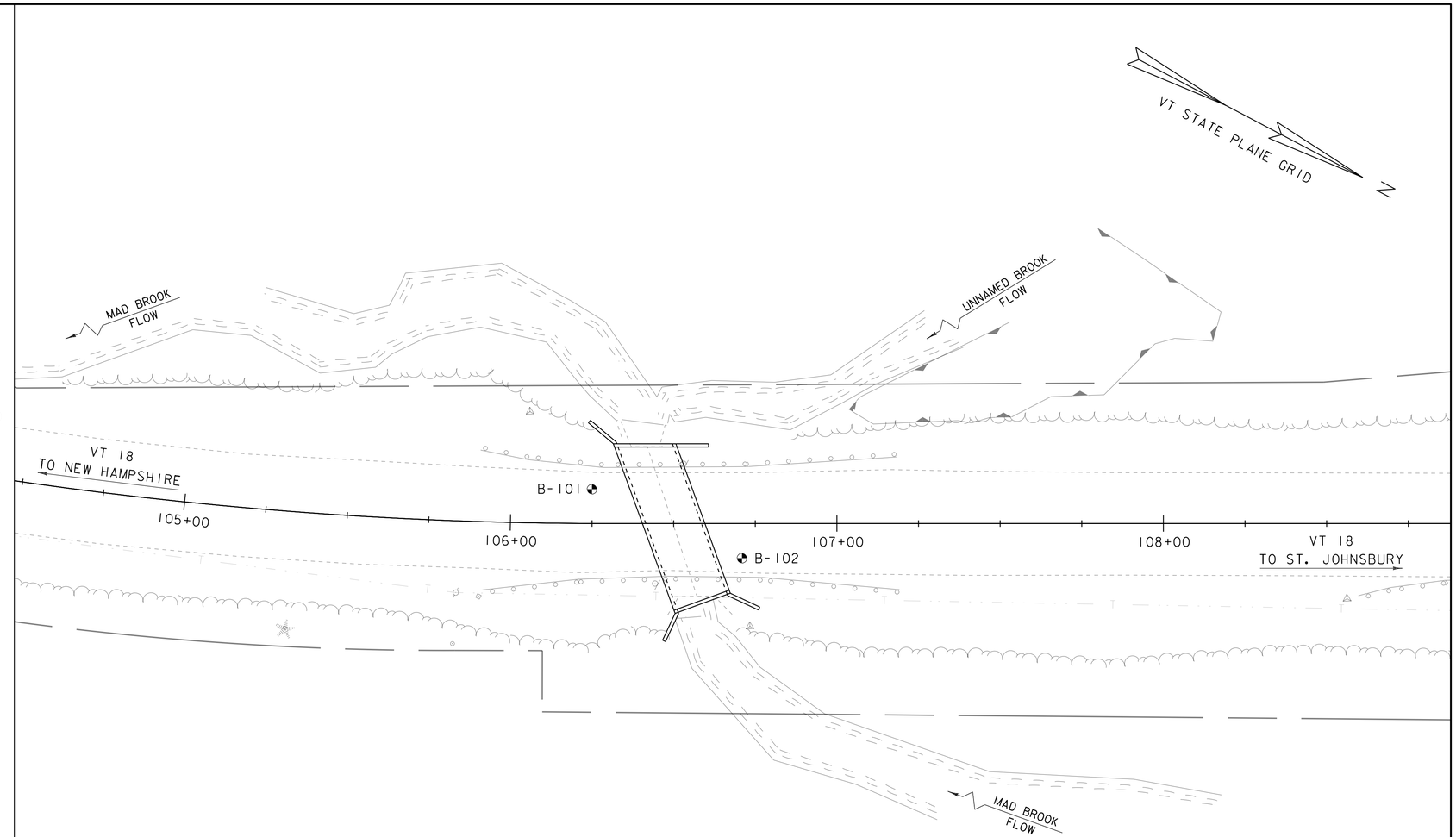
DENSITY (GRANULAR SOILS)		CONSISTENCY (COHESIVE SOILS)	
N	DESCRIPTIVE TERM	N	DESCRIPTIVE TERM
<5	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-24	Med. Dense	5-8	Med. Stiff
25-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		31-60	Hard
		>60	Very Hard

COMMONLY USED SYMBOLS

▼	Water Elevation
⊗	Standard Penetration Boring
⊕	Auger Boring
⊙	Rod Sounding
S	Sample
N	Standard Penetration Test Blow Count Per Foot For: 2" O.D. Sampler 1 3/8" I.D. Sampler Hammer Weight Of 140 Lbs. Hammer Fall Of 30"
VS	Field Vane Shear Test
US	Undisturbed Soil Sample
B	Blast
DC	Diamond Core
MD	Mud Drill
WA	Wash Ahead
HSA	Hollow Stem Auger
AX	Core Size 1 1/8"
BX	Core Size 1 5/8"
NX	Core Size 2 1/8"
M	Double Tube Core Barrel Used
LL	Liquid Limit
PL	Plastic Limit
PI	Plasticity Index
NP	Non Plastic
w	Moisture Content (Dry Wgt. Basis)
D	Dry
M	Moist
MTW	Moist To Wet
W	Wet
Sat	Saturated
Bo	Boulder
Gr	Gravel
Sa	Sand
Si	Silt
Cl	Clay
HP	Hardpan
Le	Ledge
NLTD	No Ledge To Depth
CNPF	Can Not Penetrate Further
TLOB	Top of Ledge Or Boulder
NR	No Recovery
Rec.	Recovery
%Rec.	Percent Recovery
RQD	Rock Quality Designation
CBR	California Bearing Ratio
<	Less Than
>	Greater Than
R	Refusal (N > 100)
VTSPG	NAD83 - See Note 7

COLOR

blk	Black	pnk	Pink
bl	Blue	pu	Purple
brn	Brown	rd	Red
dk	Dark	tn	Tan
gry	Gray	wh	White
gn	Green	yel	Yellow
lt	Light	mltc	Multicolored
or	Orange		



BORING LAYOUT

SCALE 1" = 20'-0"

20 0 20

DEFINITIONS (AASHTO)

BEDROCK (LEDGE) - Rock in its native location of indefinite thickness.

BOULDER - A rock fragment with an average dimension > 12 inches.

COBBLE - Rock fragments with an average dimension between 3 and 12 inches.

GRAVEL - Rounded particles of rock < 3" and > 0.0787" (#10 sieve).

SAND - Particles of rock < 0.0787" (#10 sieve) and > 0.0029" (#200 sieve).

SILT - Soil < 0.0029" (#200 sieve), non or slightly plastic and exhibits no strength when air-dried.

CLAY - Fine grained soil, exhibits plasticity when moist and considerable strength when air-dried.

VARVED - Alternate layers of silt and clay.

HARDPAN - Extremely dense soil, cemented layer, not softened when wet.

MUCK - Soft organic soil (containing > 10% organic material.

MOISTURE CONTENT - Weight of water divided by dry weight of soil.

FLOWING SAND - Granular soil so saturated (loose) that it flows into drill casing during extraction of wash rod.

STRIKE - Angle from magnetic north to line of intersection of bed with a horizontal plane.

DIP - Inclination of bed with a horizontal plane.

GENERAL NOTES

1. The subsurface explorations shown herein were made between 4-1-14 and 4-4-14 by the Agency.

2. Soil and rock classifications, properties and descriptions are based on engineering interpretation from available subsurface information by the Agency and may not necessarily reflect actual variations in subsurface conditions that may be encountered between individual boring or sample locations.

3. Observed water levels and/or conditions indicated are as recorded at the time of exploration and may vary according to the prevailing rainfall, methods of exploration and other factors.

4. Engineering judgment was exercised in preparing the subsurface information presented herein. Analysis and interpretation of subsurface data was performed and interpreted for Agency design and estimating purposes. Presentation of the information in the Contract is intended to provide the Contractor access to the same data available to the Agency. The subsurface information is presented in good faith and is not intended as a substitute for personal investigation, independent interpretation, independent analysis or judgment by the Contractor.

5. Pictorial structure details shown on the boring plan layout or soils profile are for illustrative purposes only and may not accurately portray final contract details.

6. Terminology used on boring logs to describe the hardness, degree of weathering, and spacing of fractures, joints and other discontinuities in the bedrock is defined in the AASHTO Manual on Subsurface Investigations, 1988.

7. Northing and Easting coordinates are shown in Vermont State Plane Grid North American Datum 1983 in meters and survey feet.

BORING CHART

HOLE NO.	SURV. STATION	OFFSET	GROUND ELEV.	ELEV. TLOB
B-101	106+25	-11.0	911.41	882.80
B-102	106+71	10.0	914.10	873.10

PROJECT NAME: WATERFORD
PROJECT NUMBER: BF 0225(4)

FILE NAME: s13c268bdr_bor.dgn
PROJECT LEADER: K. HIGGINS
DESIGNED BY: J. SALVATORI
BORING INFORMATION SHEET

PLOT DATE: 30-SEP-2015
DRAWN BY: J. SALVATORI
CHECKED BY: ------
SHEET 8 OF 17

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

WATERFORD
BF 0225(4)
VT-18 BR-7

Boring No.: **B-101**
Page No.: 1 of 2
Pin No.: 13C268
Checked By:

Boring Crew: JUDKINS, DAIGNEAULT
Date Started: 4/01/14 Date Finished: 4/02/14
VTSPG NAD83: N 680559.75 ft E 1795988.59 ft
Station: 44+75 Offset: -11.00
Ground Elevation: 911.1 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/01/14	5.0	While drilling.
04/02/14	8.0	Before drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate min/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Asphalt Pavement, 0.0 ft - 0.45 ft								
		A-1-b, SiGrSa, Lt/brn, Moist, Rec. = 0.9 ft				22-11-11-16 (22)	9.9	33.5	45.4	21.1
2.5		Field Note:, Roller coned ahead. Cleaned out casing.								
		A-2-4, SiGrSa, Lt/brn, MTW, Rec. = 0.9 ft, Lab Note: Broken Rock was within sample.				24-R@5.0" (R)	23.1	33.6	34.8	31.6
5.0		A-1-a, SaGr, brn, MTW, Rec. = 0.8 ft, NXDC, Cleaned out casing.				48-29-14-R@3.5" (36)	15.0	59.9	25.2	14.9
7.5		A-1-b, SaGr, brn, MTW, Rec. = 1.0 ft				24-14-22-16 (36)	15.3	61.3	22.0	16.7
10.0		A-1-b, SiSaGr, brn-gry, Moist, Rec. = 0.3 ft, Lab Note: Broken Rock was within sample.				35-17-14-11 (31)	10.8	42.7	35.3	22.0
		Field Note:, No Recovery, NXDC, Cobbles				R@1.0" (R)				
12.5		A-4, GrSaSi (HP), gry, Moist, Rec. = 1.6 ft				9-15-16-25 (31)	9.9	23.7	28.1	48.2
15.0		A-4, GrSaSi (HP), gry, Moist, Rec. = 1.0 ft				27-37-26-R@2.5" (63)	9.3	24.1	32.6	43.3
17.5		A-4, SaSi (HP), gry, Moist, Rec. = 1.6 ft				25-34-32-R@2.5" (66)	12.1	6.1	32.1	61.8
		Field Note:, NXDC, Cleaned out casing								
20.0		A-4, SaSi (HP), gry, Moist, Rec. = 1.4 ft				23-32-39-R@1.0" (71)	10.7	12.5	31.1	56.4
		Field Note:, NXDC, Cleaned out casing								

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 WATERFORD BF 0225(4).GPJ VERMONT AOT.GDT 4/1/14

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

WATERFORD
BF 0225(4)
VT-18 BR-7

Boring No.: **B-101**
Page No.: 2 of 2
Pin No.: 13C268
Checked By:

Boring Crew: JUDKINS, DAIGNEAULT
Date Started: 4/01/14 Date Finished: 4/02/14
VTSPG NAD83: N 680559.75 ft E 1795988.59 ft
Station: 44+75 Offset: -11.00
Ground Elevation: 911.1 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/01/14	5.0	While drilling.
04/02/14	8.0	Before drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate min/ft	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
22.5										
25.0		A-4, SaSi (HP), gry, Moist, Rec. = 1.1 ft				23-32-35-R@1.0" (67)	12.2	15.2	28.8	56.0
27.5										
		28.3 ft - 33.3 ft, Light gray, Fine-grained feldspathic Metasandstone, with thin slaty partings. Hard, Unweathered, Good rock, NXMDC, RMR = 67	1 (35)	100 (64)	5	Top of Bedrock @ 28.3 ft				
30.0					5					
					5					
					6					
32.5					10					
		33.3 ft - 38.3 ft, Light gray, Fine-grained feldspathic Metasandstone, with thin slaty partings. Hard, Unweathered, Good rock, NXMDC, RMR = 67	2 (35)	100 (50)	3					
35.0					3					
					3					
					3					
37.5					4					
		Hole stopped @ 38.3 ft								
40.0		Remarks: Hole collapsed at 7.0 ft.								
42.5										

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 WATERFORD BF 0225(4).GPJ VERMONT AOT.GDT 4/1/14

NOTES:

1. STA 44+75 = STA 106+25

PROJECT NAME: WATERFORD
PROJECT NUMBER: BF 0225(4)

FILE NAME: s13c268bdr_bor.dgn
PROJECT LEADER: K.HIGGINS
DESIGNED BY: J.SALVATORI
BORING LOG 1

PLOT DATE: 30-SEP-2015
DRAWN BY: J.SALVATORI
CHECKED BY:
SHEET 9 OF 17

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

WATERFORD
BF 0225(4)
VT-18 BR-7

Boring No.: **B-102**
Page No.: 1 of 2
Pin No.: 13C268
Checked By:

Boring Crew: JUDKINS, DAIGNEAULT, NIETO
Date Started: 4/03/14 Date Finished: 4/04/14
VTSPG NAD83: N 680610.25 ft E 1795985.87 ft
Station: 45+21 Offset: 10.00
Ground Elevation: 914.1 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/03/14	7.0	End of day.
04/04/14	9.0	Before drilling.
04/04/14	6.6	After drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft.	Blows/6" (N Value)	Moisture Content, %	Gravel %	Sand %	Fines %
		Field Note:, Asphalt Pavement								
		Visual Description:, SiGrSa, gry, Moist, Rec. = 1.1 ft, Lab Note: Lots of Asphalt Pavement was within sample.				19-29-R@2.5" (R)	9.8			
		A-4, SaSi, Dk/brn, MTW, Rec. = 1.5 ft, Lab Note: Broken Rock was within sample. Roller coned and cleaned out casing.				32-27-30-R@1.0" (57)	24.6	19.0	39.9	41.1
5		Field Note:, No Recovery. Appears to be sandy gravel, Roller coned and cleaned out casing.				19-17-10-7 (27)				
		Field Note:, No Recovery., Roller coned and cleaned out casing.				5-10-20-25 (30)				
10		A-1-b, SaGr, gry, MTW, Rec. = 0.8 ft, Lab Note: Broken Rock was within sample. Roller coned and cleaned out casing.				12-18-19-18 (37)	12.6	50.4	32.9	16.7
		A-4, GrSaSi, tan, Moist, Rec. = 0.3 ft, Lab Note: Broken Rock was within sample. Roller coned and cleaned out casing.				26-R@5.0" (R)	10.2	28.7	30.5	40.8
		A-4, SaGrSi, gry, Moist, Rec. = 0.8 ft, Lab Note: Broken Rock was within sample. NXDC, Cleaned out casing.				45-21-15-20 (36)	9.8	31.3	30.5	38.2
15		Field Note:, No Recovery, NXDC, Cleaned out casing.				36-15-40-R@2.5" (55)				
		A-4, GrSaSi, gry, Moist, Rec. = 1.2 ft, Lab Note: Broken Rock was within sample. NXDC, Cleaned out casing.				40-27-36-R@0.0" (63)	9.8	22.5	35.4	42.1
20		A-4, SaSi (HP), gry, Moist, Rec. = 1.5 ft				19-25-30-R@3.5" (55)	11.6	3.9	29.6	66.5
25		A-4, SaGrSi (HP), gry, Moist, Rec. = 1.0 ft, Lab Note: Broken Rock was within sample. NXDC, Cleaned out casing.				22-27-18-28 (45)	11.1	24.9	20.7	54.4

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 WATERFORD BF 0225(4).GPJ VERMONT AOT.GDT 4/11/14

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

WATERFORD
BF 0225(4)
VT-18 BR-7

Boring No.: **B-102**
Page No.: 2 of 2
Pin No.: 13C268
Checked By:

Boring Crew: JUDKINS, DAIGNEAULT, NIETO
Date Started: 4/03/14 Date Finished: 4/04/14
VTSPG NAD83: N 680610.25 ft E 1795985.87 ft
Station: 45+21 Offset: 10.00
Ground Elevation: 914.1 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/03/14	7.0	End of day.
04/04/14	9.0	Before drilling.
04/04/14	6.6	After drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Run (Dip deg.)	Core Rec. % (RQD %)	Drill Rate minutes/ft.	Blows/6" (N Value)	Moisture Content, %	Gravel %	Sand %	Fines %
		Field Note:, NXDC, advanced casing								
30		A-4, SaGrSi (HP), gry, Moist, Rec. = 1.1 ft, Lab Note: Broken Rock was within sample. NXDC, Cleaned out casing.				11-14-16-17 (30)	11.9	27.5	22.2	50.3
		Field Note:, NXDC, advanced casing								
35		Field Note:, No Recovery				10-11-R@5.0" (R)				
40		Geologist's Note:, Till, (HP), NXMDC, Drill time = 3, 15, 8, 21, minutes per foot.								
		41.0 ft - 46.0 ft, Dark gray, Slate, Moderately hard, Unweathered, Good rock, NXMDC, RMR = 68	1 (40)	100 (84)	6 6 7 7 8	Top of Bedrock @ 41.0 ft				
45		46.0 ft - 51.0 ft, Dark gray, Slate, Moderately hard, Unweathered, Good rock, NXMDC, RMR = 68	2 (40)	100 (86)	5 6 7 7 7					
50		Hole stopped @ 51.0 ft								
55		Remarks: Hole collapsed at 8.2 ft.								

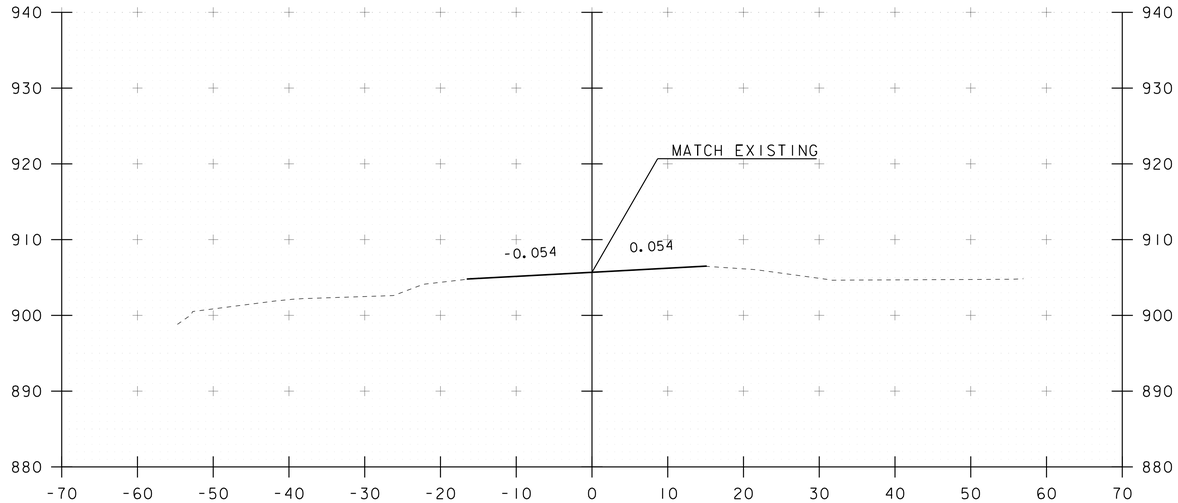
Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 WATERFORD BF 0225(4).GPJ VERMONT AOT.GDT 4/11/14

NOTES:

1. STA 45+21 = STA 106+71

PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4 101/100	
FILE NAME: s13c268bdr_bor.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: J.SALVATORI
DESIGNED BY: J.SALVATORI	CHECKED BY:
BORING LOG 2	SHEET 10 OF 17



105+00
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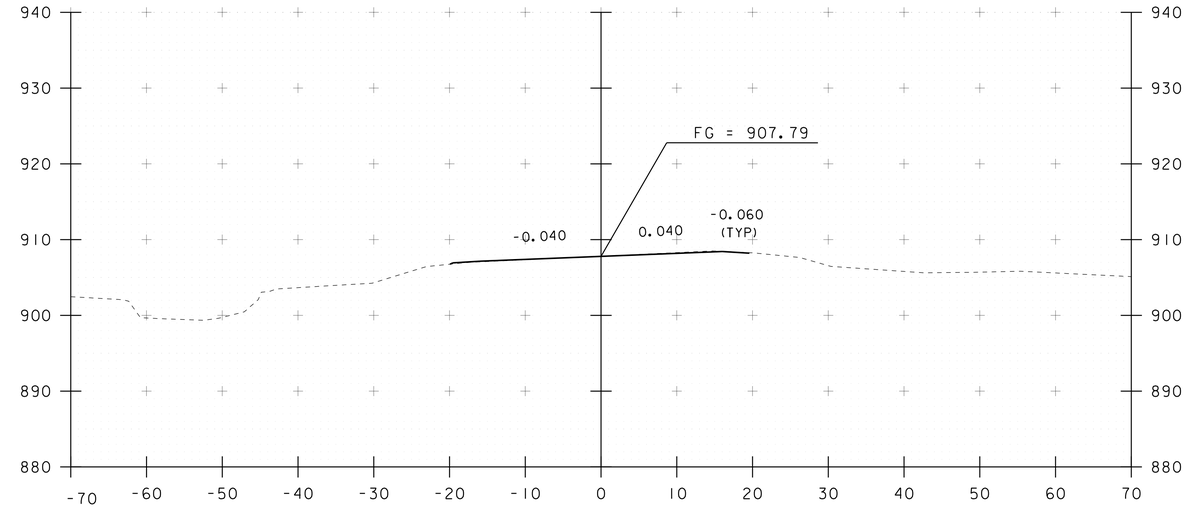

105+50
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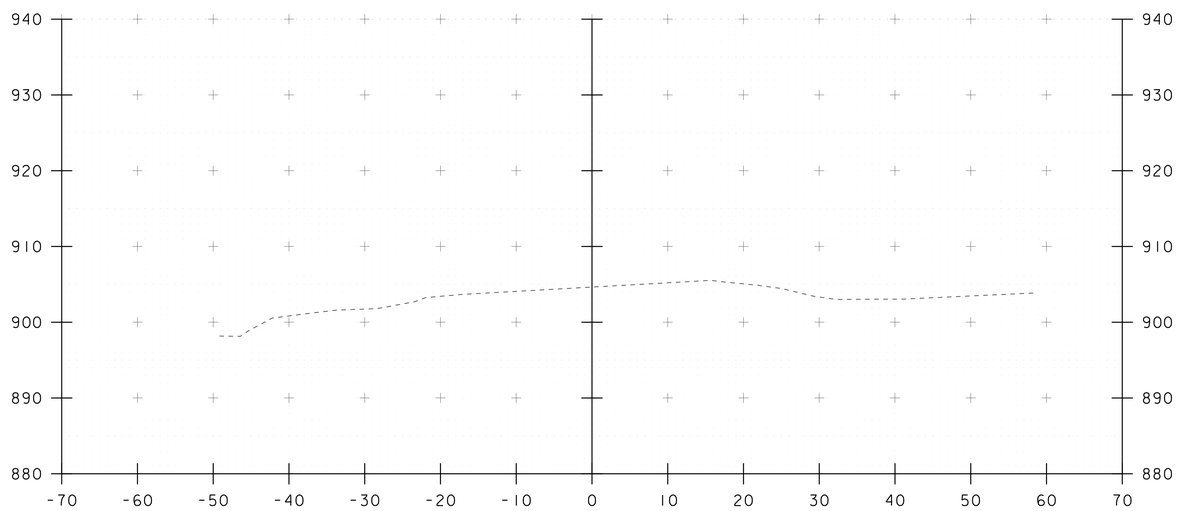
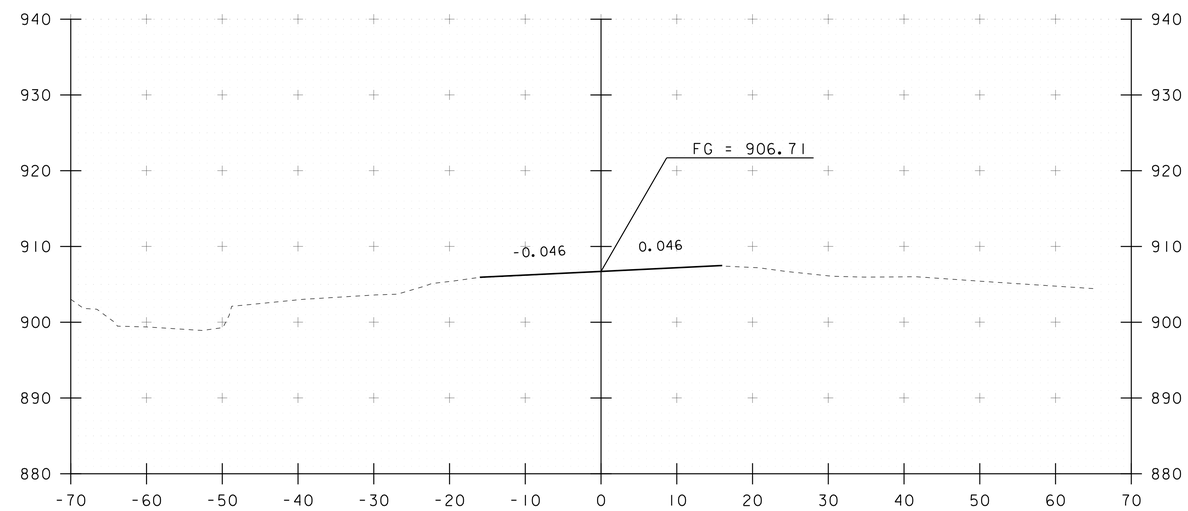


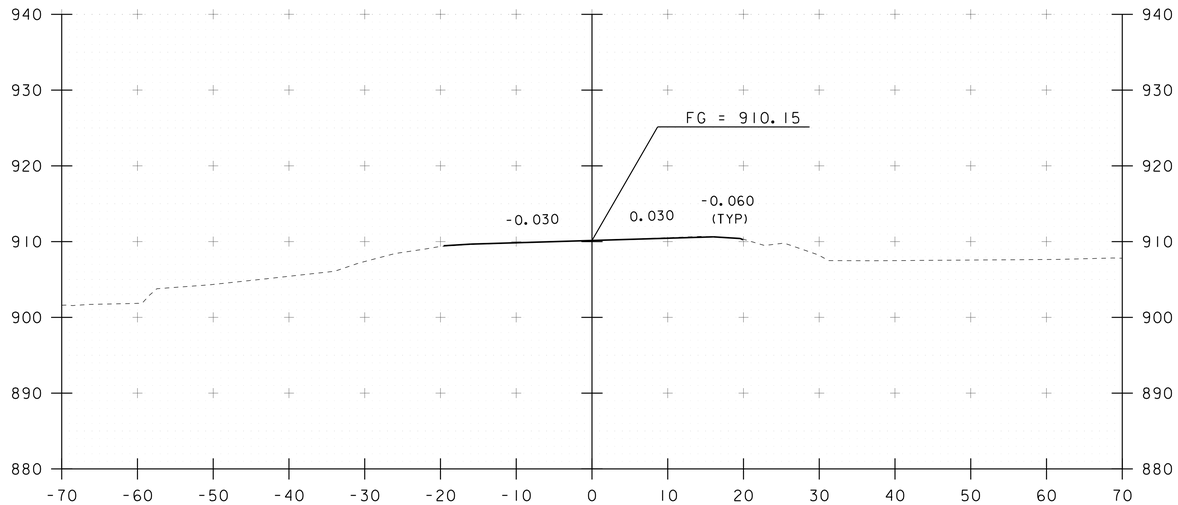
104+75



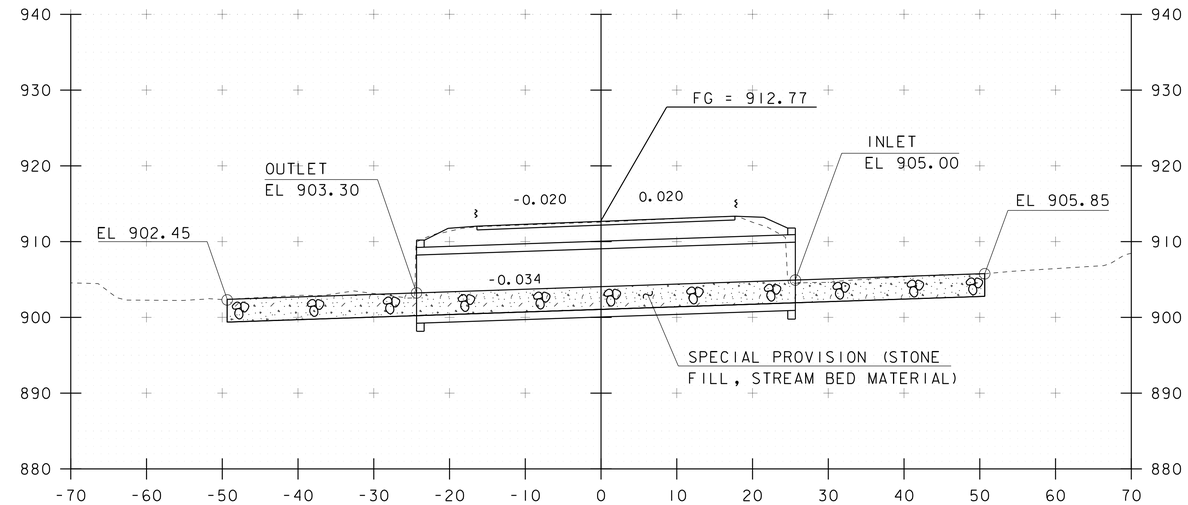
105+25

STA. 104+75 TO STA. 105+50

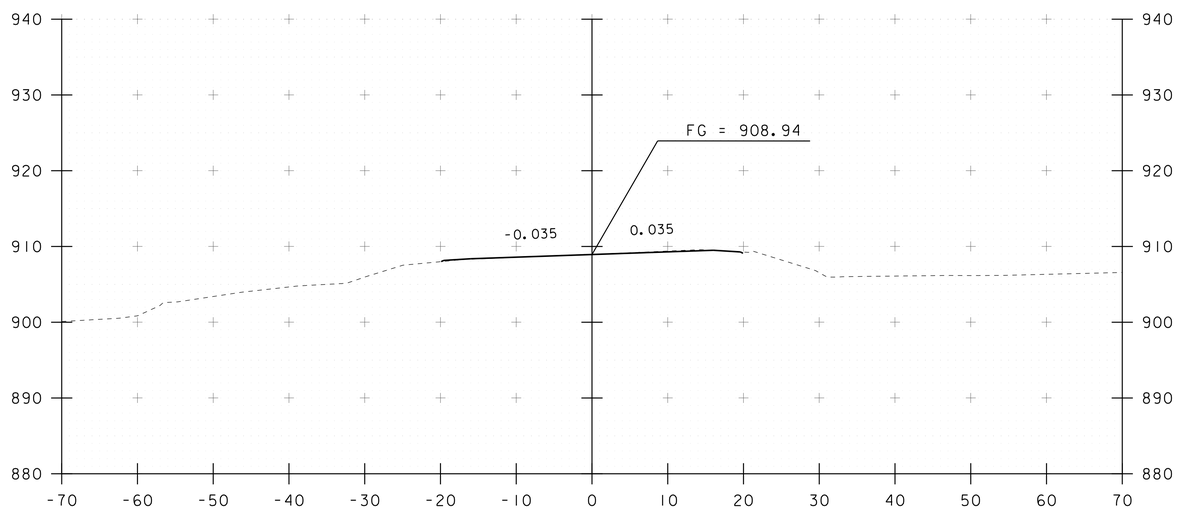
PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
MAINLINE SECTIONS	SHEET 11 OF 17



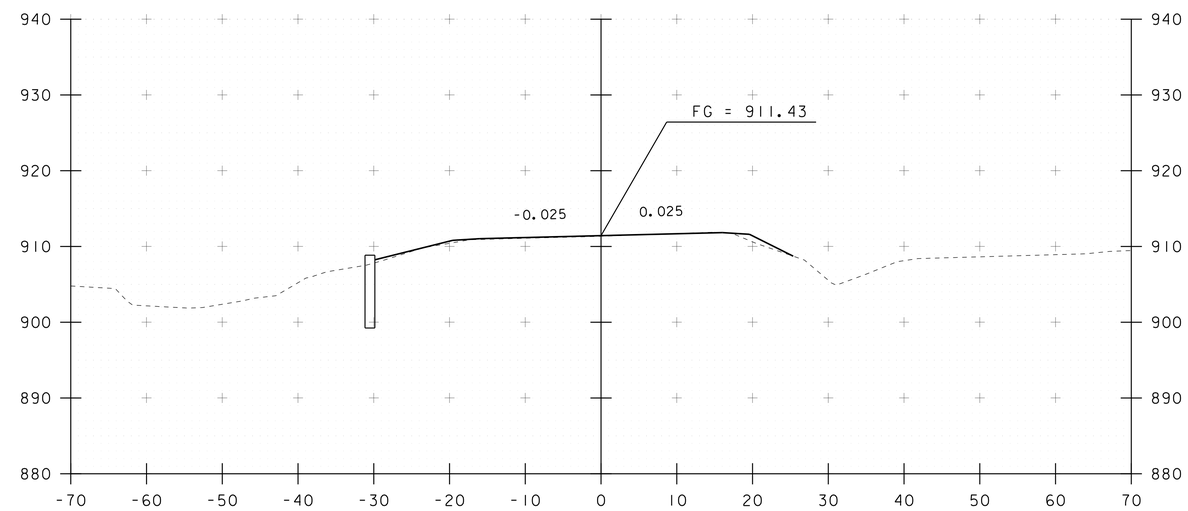
106+00



106+50 @ 20° SKEW



105+75

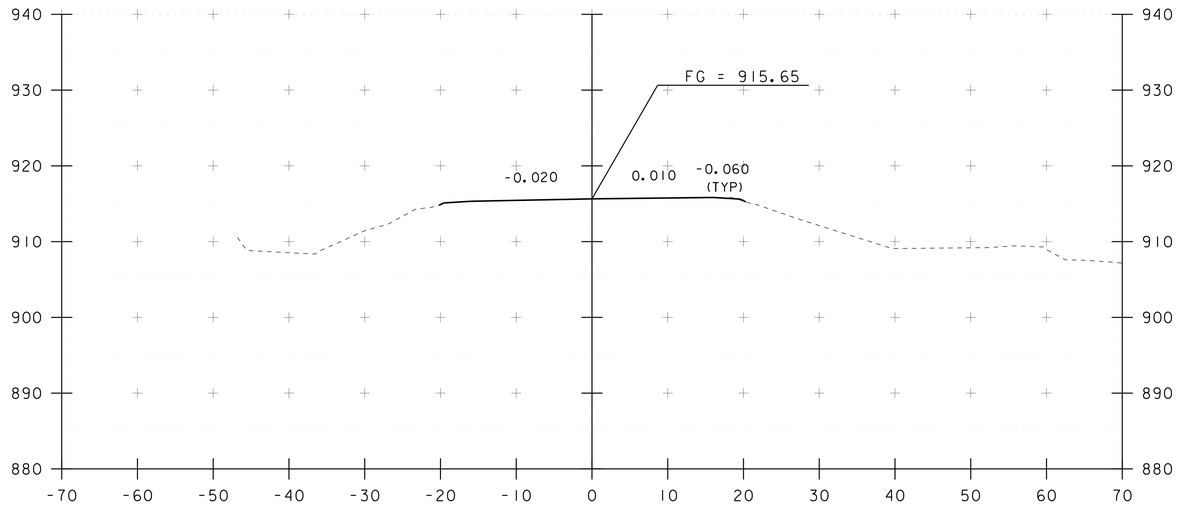


BEGIN BRIDGE @ 106+40.42

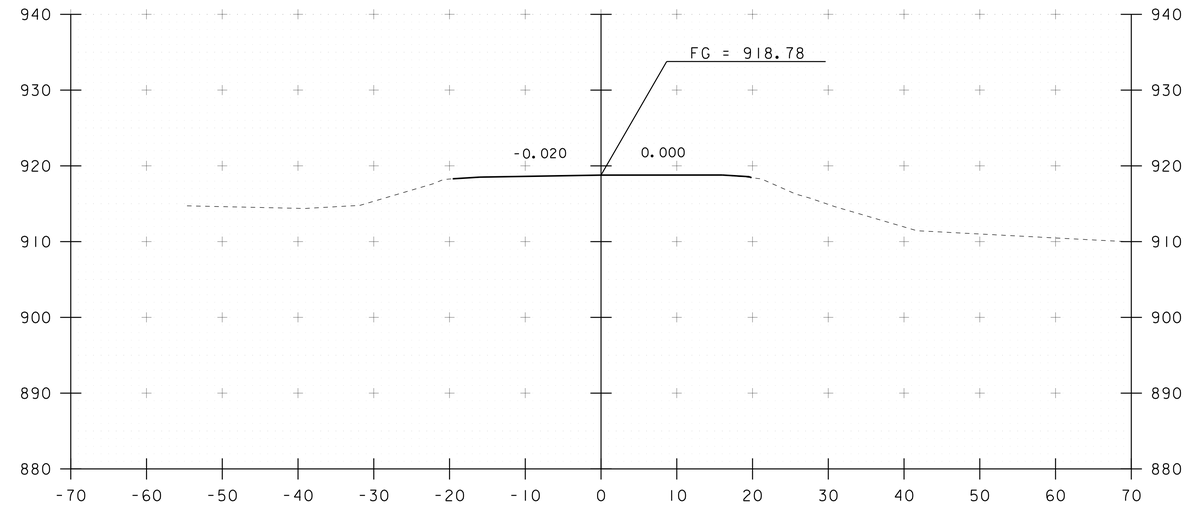
106+25

STA. 105+75 TO STA. 106+50

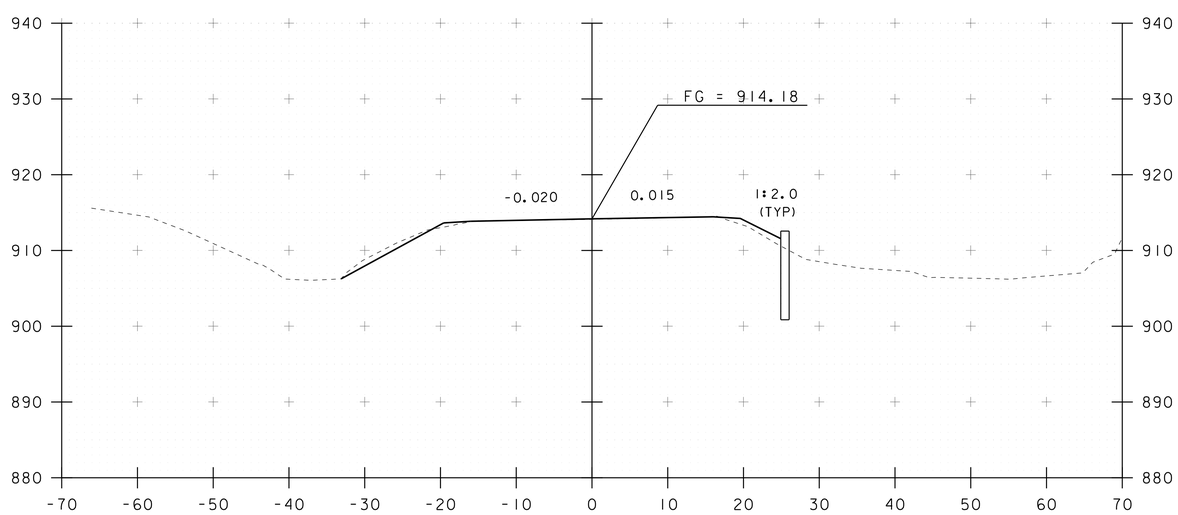
PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
MAINLINE SECTIONS	SHEET 12 OF 17



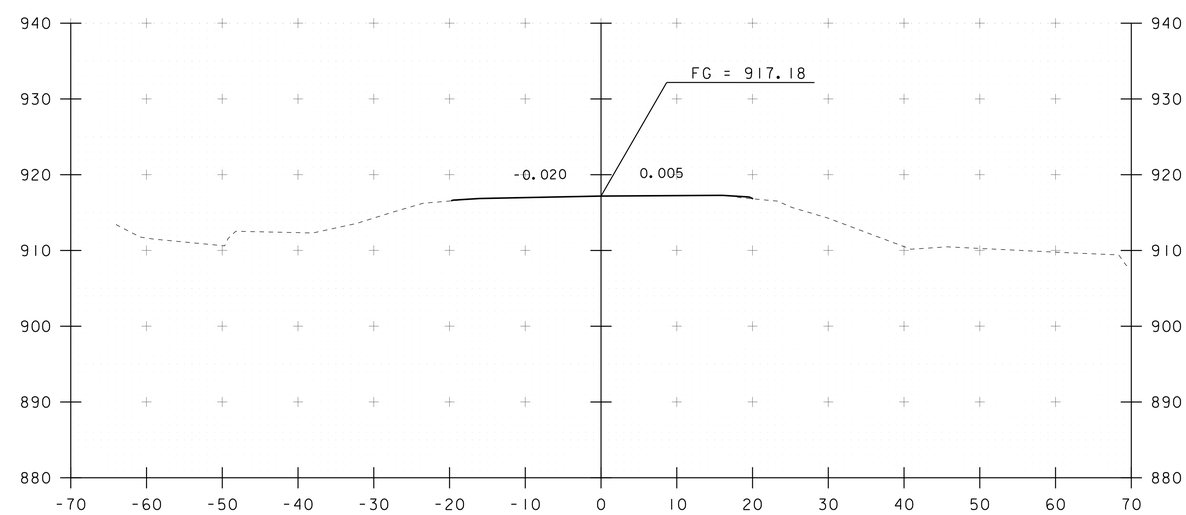
107+00



107+50
END PROJECT



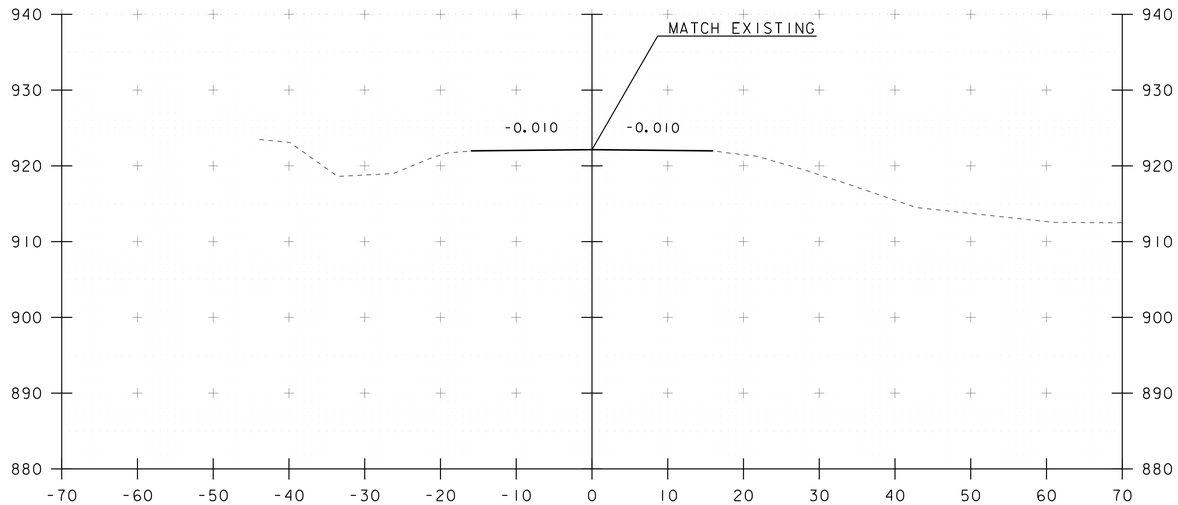
106+75
END BRIDGE @ 106+59.58



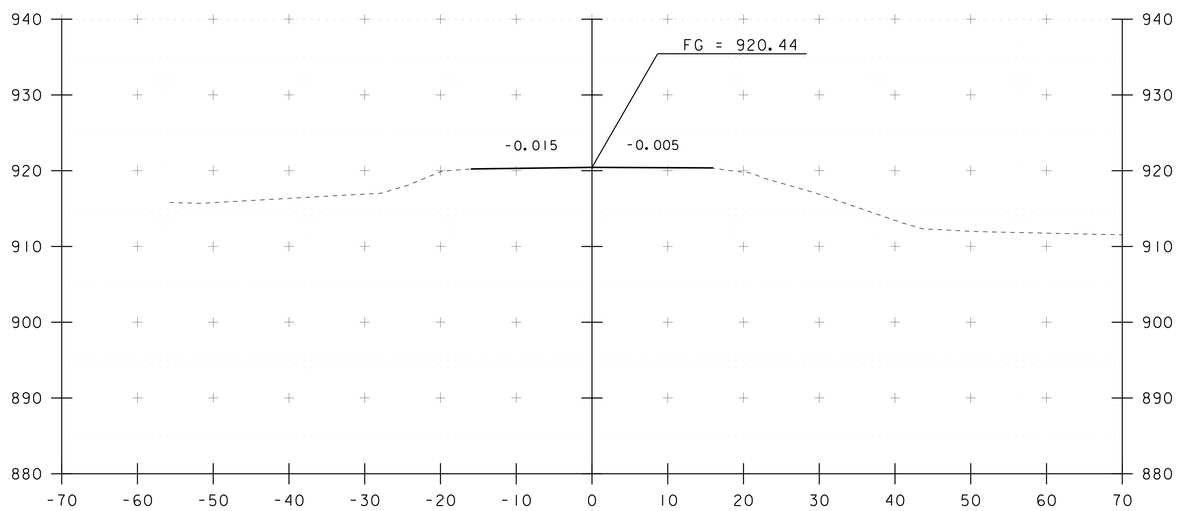
107+25

STA. 106+75 TO STA. 107+50

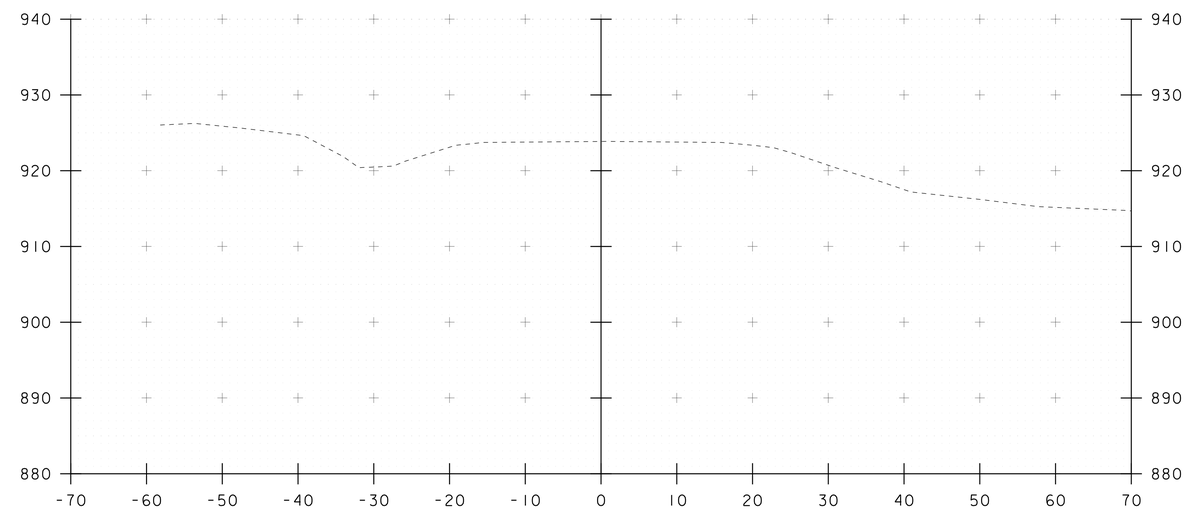
PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
MAINLINE SECTIONS	SHEET 13 OF 17



108+00
END APPROACH



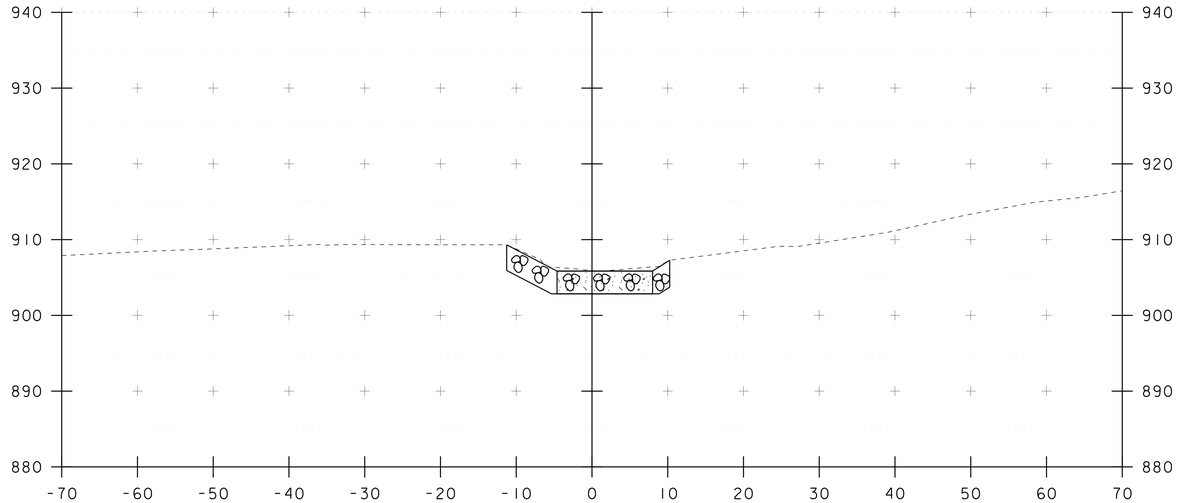
107+75



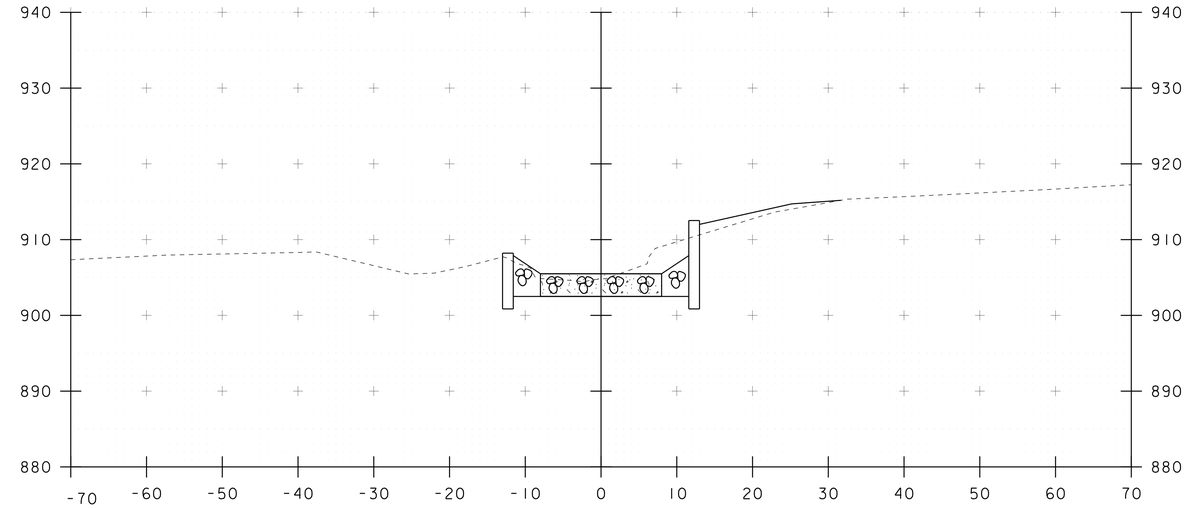
108+25

STA. 107+75 TO STA. 108+25

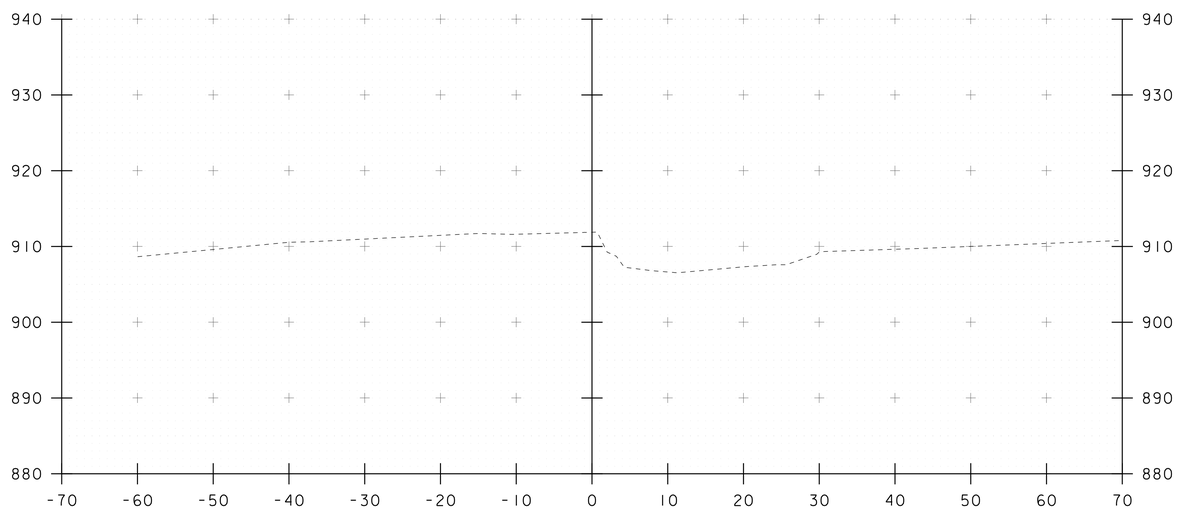
PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
MAINLINE SECTIONS	SHEET 14 OF 17



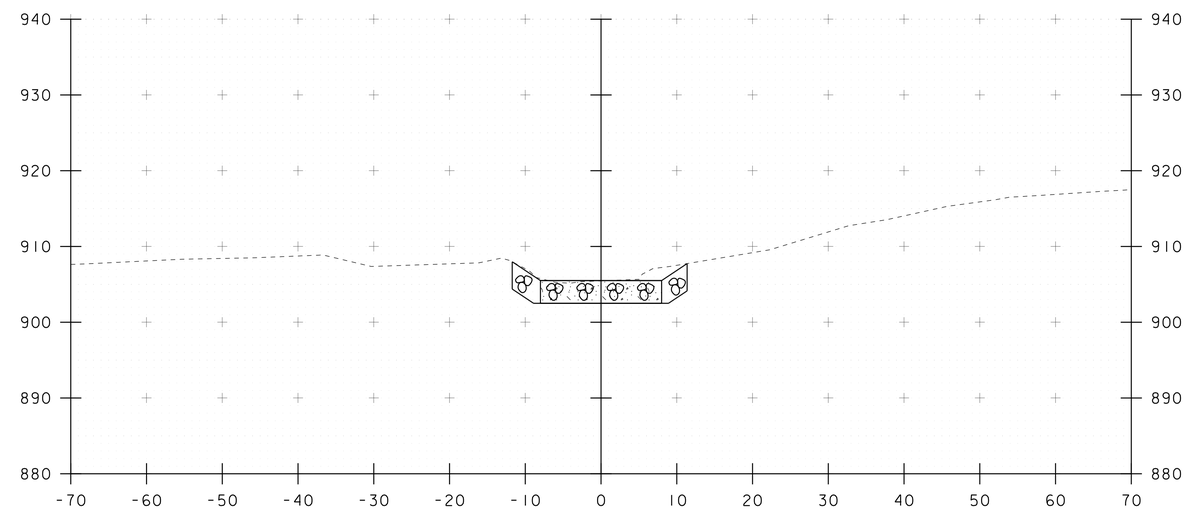
50+50



50+70



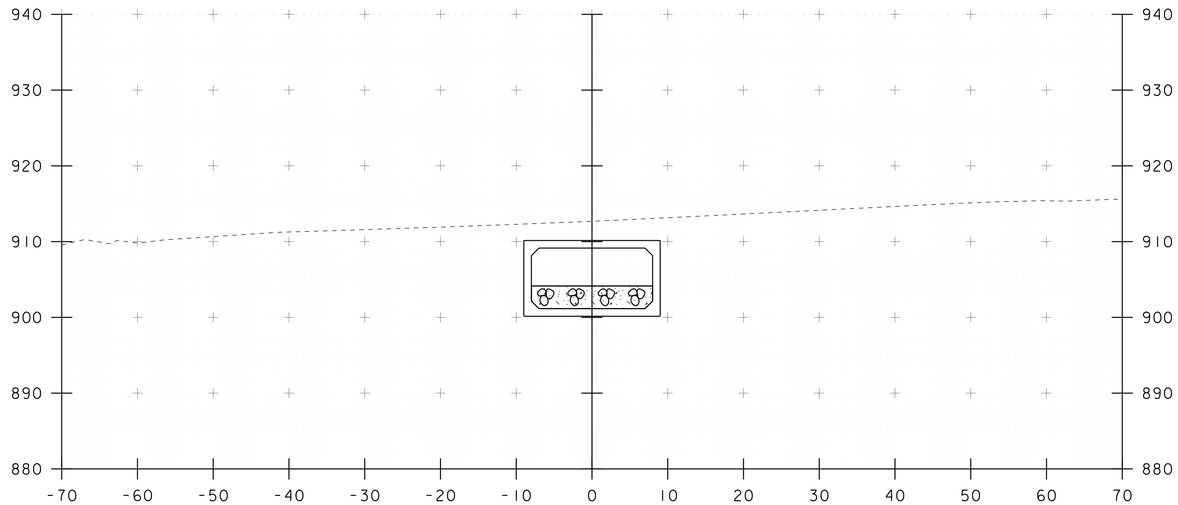
50+25



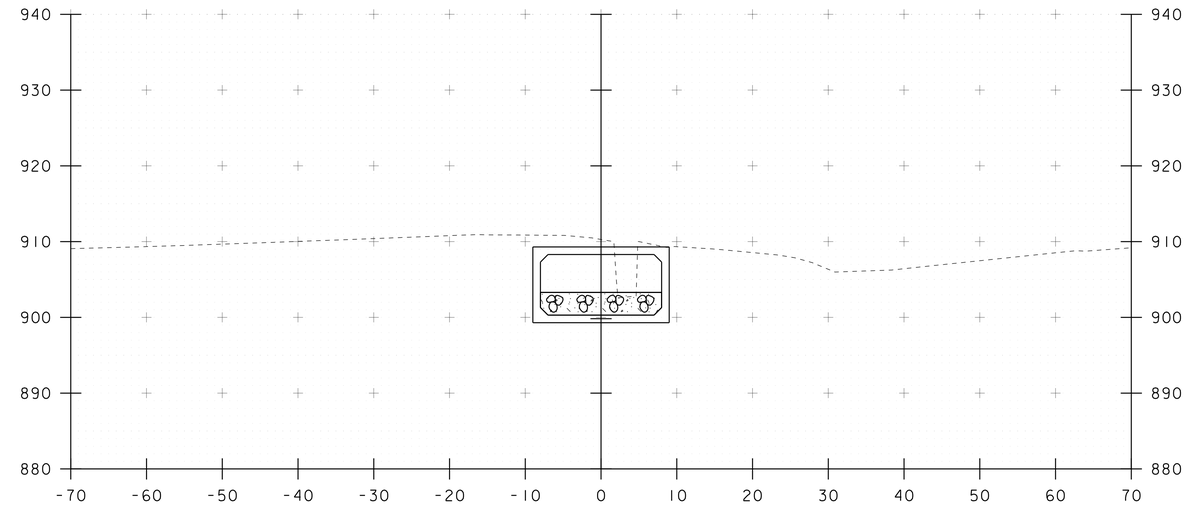
50+60

STA. 50+25 TO STA. 50+70

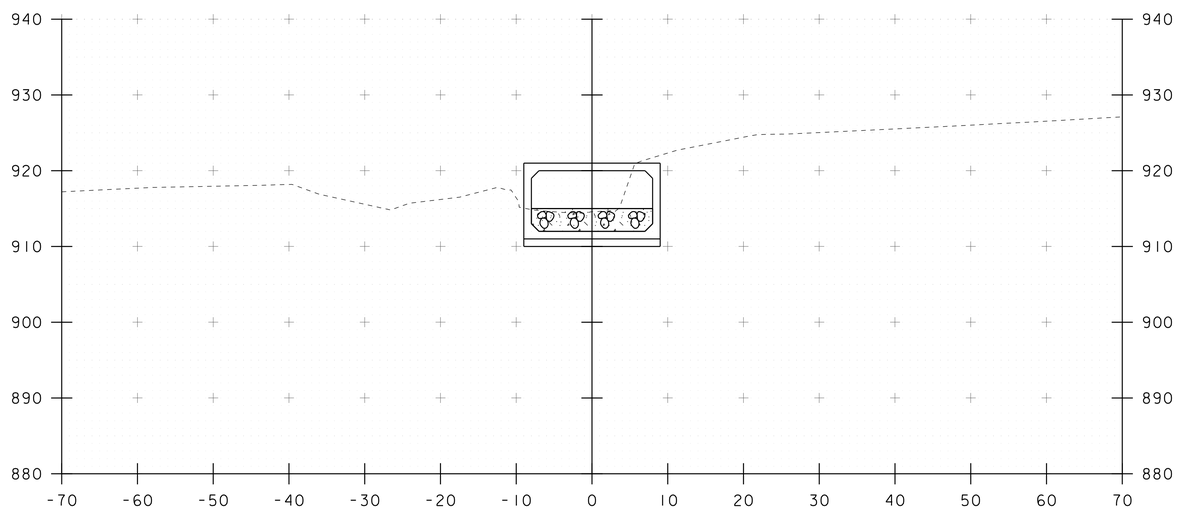
PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
CHANNEL SECTIONS	SHEET 15 OF 17



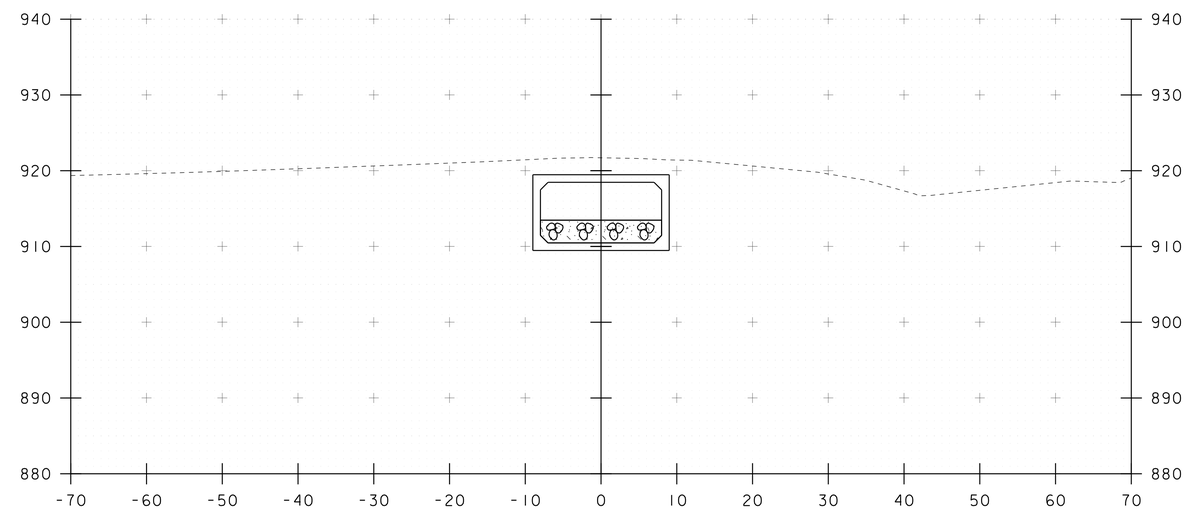
51+00



51+25



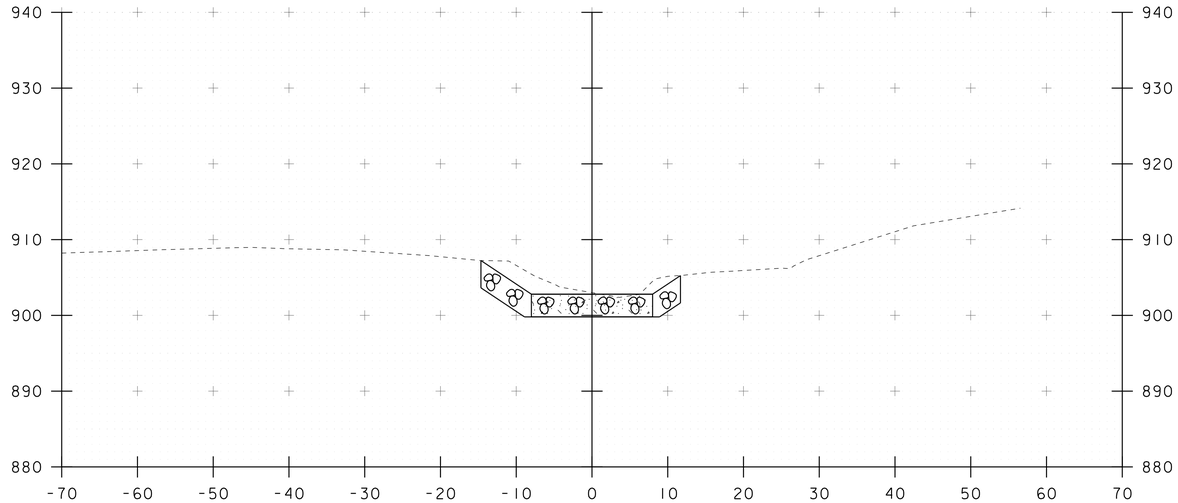
50+75



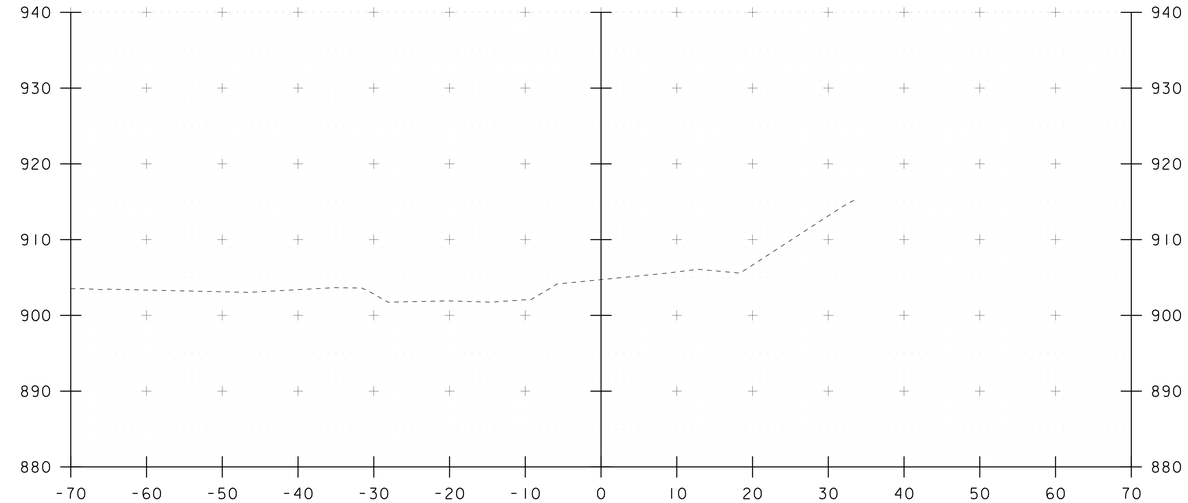
51+20

STA. 50+75 TO STA. 51+25

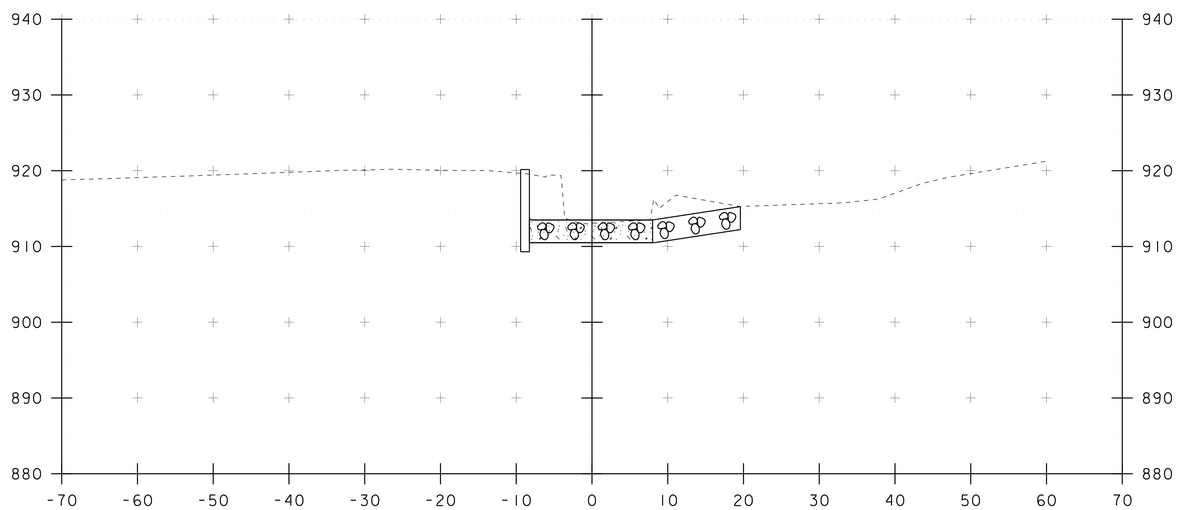
PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
CHANNEL SECTIONS	SHEET 16 OF 17



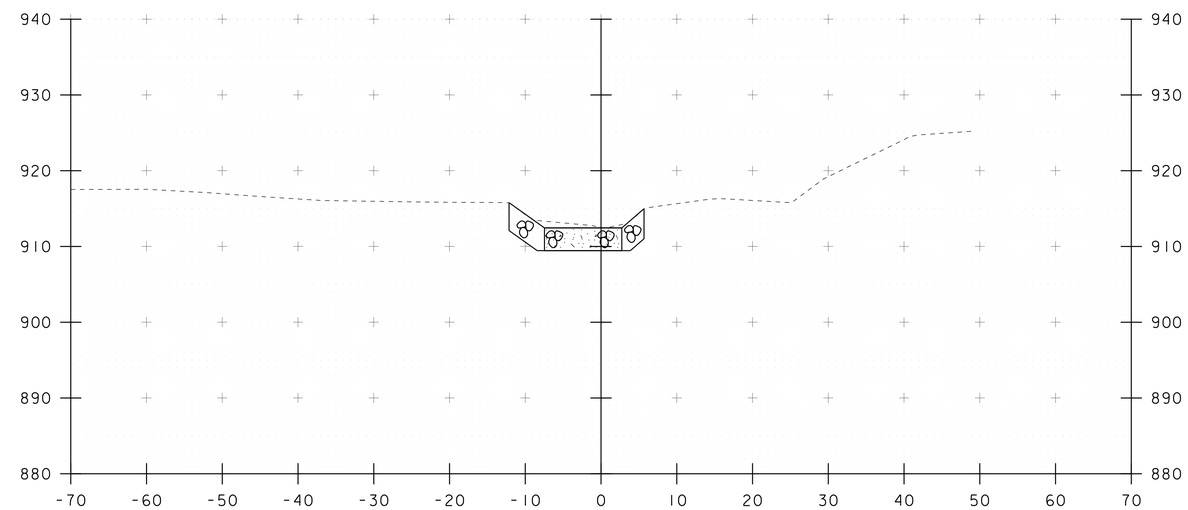
51+40



51+75



51+30



51+50

STA. 51+30 TO STA. 51+75

PROJECT NAME: WATERFORD	
PROJECT NUMBER: BF 0225(4)	
FILE NAME: sl3c268xs.dgn	PLOT DATE: 30-SEP-2015
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: J.SALVATORI	CHECKED BY: J.SALVATORI
CHANNEL SECTIONS	SHEET 17 OF 17