WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	1	137
PROJECT FILE NO. 604532				

TITLE & INDEX

THE COMMONWEALTH OF MASSACHUSETTS
HIGHWAY DEPARTMENT

CONSTRUCTION
OF
BRUCE FREEMAN RAIL TRAIL PHASE 2A
IN THE TOWNS OF
WESTFORD, CARLISLE & ACTON

MIDDLESEX COUNTY

FEDERAL AID PROJECT NO. XXX-XXXX

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE & INDEX
2	GENERAL LEGEND, ABBREVIATIONS & NOTES
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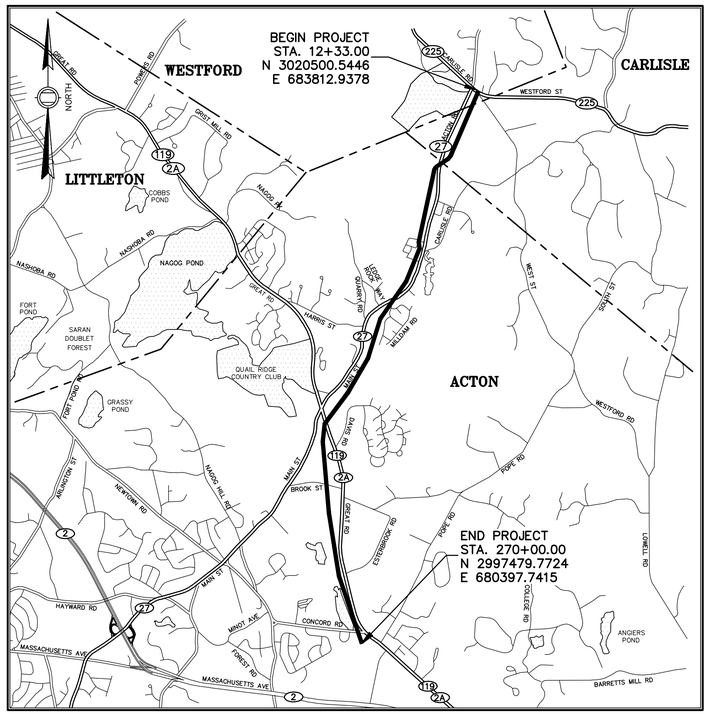
Appendix

BICYCLE LOOP DETECTOR DETAILS
35' FOOT – TYPE II MAST ARM
CORED PIER FOUNDATION



LOCATION MAP

HORIZONTAL SCALE
(IN FEET)
3000 0 3000 6000 9000 12000

LENGTH OF PROJECT – 25,784 FT ℄ = (4.88 MILES)

SCALES – AS NOTED

APRIL 2008

THE 1988 MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES (ENGLISH EDITION); THE SUPPLEMENTAL SPECIFICATIONS (ENGLISH EDITION), DATED JUNE 6, 2006; THE 1977 MDPW CONSTRUCTION STANDARDS (ENGLISH EDITION); THE METRIC/ENGLISH SUPPLEMENTAL DRAWINGS, DATED APRIL 2003; THE 2003 "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" WITH LATEST REVISIONS; THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS; THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING; AND THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z–60.1–2004); AND ALL AMENDMENTS WILL GOVERN.

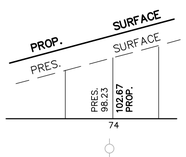
TRAIL DESIGN CRITERIA

DESIGN SPEED:	=	20 MPH
MINIMUM HORIZONTAL CURVE RADIUS	=	100' (WARNING SIGNING FOR RADII < 100')
MINIMUM LENGTH OF CREST VERTICAL CURVE	=	BASED ON SSD/GRADE
MAXIMUM GRADE FOR LEVEL TERRAIN	=	5.0% (WARNING SIGNING FOR GRADES > 5.0%)

GPI Greenman-Pedersen, Inc.
Engineers, Architects, Planners, Construction Engineers & Inspectors
105 Central Street, Suite 4100, Stoneham, MA 02180
Tel: (781) 279-5500 Fax: (781) 279-5501
http://www.gpinet.com

CONVENTIONAL SYMBOLS

COUNTY, CITY, OR TOWN BOUNDARY .....
COUNTY, CITY OR TOWN SIDE LINE .....
FENCE LINE ..... — X — X —
BASE LINE OR SURVEY LINE ..... 74 PC
N57° 18' 41"E 59.57
RIGHT OF WAY LINE .....
CULVERT .....



ELEVATIONS .....
POLE .....

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

25% SUBMISSION

MASS HIGHWAY
MASSACHUSETTS HIGHWAY DEPARTMENT

RECOMMENDED FOR APPROVAL

CHIEF ENGINEER Date

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED

DIVISION ADMINISTRATOR Date

APPROVED

MHD COMMISSIONER Date

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	2	137
PROJECT FILE NO. 604532				

GENERAL LEGEND, ABBREVIATIONS & NOTES

GENERAL LEGEND

EXISTING	PROPOSED	
		STATE BOUNDARY LINE
		CITY, TOWN OR COUNTY BOUNDARY LINE
		STATE HIGHWAY LAYOUT LINE
		CITY, TOWN OR COUNTY LAYOUT LINE
		EASEMENT LINE
		PROPERTY LINE
WF		EDGE OF VEGETATED WETLAND/WETLAND FLAG
		HIGHWAY/PROPERTY BOUND (TYPE NOTED)
N00°00'00"E +93.16	PT N00°00'00"E +93.16	CONSTRUCTION/SURVEY BASELINE
		TREE (TYPE & SIZE NOTED)
		EDGE OF WOODS/SHRUBS
		HANDICAP RAMP
		BENCH
MB	MB	MAIL BOX
PM	PM	PARKING METER
		SIGN
X X X		FENCE (SIZE & TYPE AS NOTED)
		HIGHWAY GUARD (TYPE AS NOTED)
		BALANCED WALL (SIZE & TYPE AS NOTED)
		RETAINING WALL (SIZE & TYPE AS NOTED)
76	76	CONTOURS
x100.00 , 100.15/100.00	x100.00 , 100.15/100.00	SPOT ELEVATION, TOP AND BOTTOM CURB
		CURB OR BERM (TYPE AS NOTED)
EOP	EOP	EDGE OF PAVEMENT (NO CURB OR BERM)
		BACK OF SIDEWALK
		TOP OR BOTTOM OF SLOPE (CUT OR FILL)
	SAW	SAWCUT LINE
		APPROX. COLD PLANING/TRANSITION AREA
		GRANITE RUBBLE BLOCK PAVEMENT
		SCORED CONCRETE PAVEMENT
	B-1	BORINGS, PAVEMENT CORES (SEE SPEC. PROV.)
D		DRAIN LINE
UD	UD	UNDERDRAIN (PERFORATED)
		DIRECTION OF FLOW
		PAVED WATERWAY
DMH	DMH	DRAIN MANHOLE
CB,GI,DI	CB,GI,DI	CATCH BASIN, DROP OR GUTTER INLET
CBCI,GICI	CBCI,GICI	CATCH BASIN (OR GUTTER INLET) WITH CURB INLET
LB		LEACHING BASIN
FE		FLARED END
HDWL		HEADWALL
S	S	SEWER LINE
SMH	SMH	SEWER MANHOLE
CS	CS	COMBINED SEWER LINE
CSMH	CSMH	COMBINED SEWER MANHOLE
FMGV	FMGV	FORCE MAIN GATE VALVE
W	W	WATER MAIN
WMH	WMH	WATER MANHOLE
HYD		HYDRANT
FA,FSP	FA,FSP	FIRE ALARM BOX, FIRE STAND PIPE
		REDUCER
CS,WSO		CURB STOP OR WATER SHUT OFF
WG	WG	WATER GATE
G	G	GAS MAIN
GG	GG	GAS GATE
GSO	GSO	GAS SHUT OFF
E	E	ELECTRICAL LINE OR DUCT
		ELECTRICAL CONDUIT
EMH	EMH	ELECTRICAL MANHOLE
EHH		ELECTRICAL HANDHOLE
PB	PB	PULL BOX (12" x 12")
JB,SB	JB,SB	ELECTRICAL JUNCTION OR SWITCH BOX
LCC		ELECTRICAL LOAD CENTER CABINET W/FDN
LP		LIGHT POLE
UP		UTILITY POLE
GUY	GUY	GUY WIRE & ANCHOR
T	T	TELEPHONE LINE OR DUCT
TMH	TMH	TELEPHONE MANHOLE
ST	ST	STEAM LINE
STMH	STMH	STEAM MANHOLE/TUNNEL HATCH
F	F	PLUG OR CAP
		DELINEATOR
OHW		OVERHEAD WIRES
CATV		CABLE TV

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

GENERAL ABBREVIATIONS

ABAN	ABANDON
ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
ADJ	ADJUST
APPROX	APPROXIMATE
BC	BOTTOM OF CURB
BD	BOUND
BIT CONC	BITUMINOUS CONCRETE
BO	BY OTHERS
BM	BENCH MARK
BW	BOTTOM OF WALL
CEM CONC	CEMENT CONCRETE
CC	CENTER OF CURVE
CCB	CAPE COD BERM
CI	CURB INLET
CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
CLR	CLEARANCE
CLF	CHAIN LINK FENCE
CLDI	CEMENT LINED DUCTILE IRON
CMP	CORRUGATED METAL PIPE
CONST	CONSTRUCTION
CP	CENTER POINT
CPP	CORRUGATED PLASTIC PIPE
COND	CONDUIT
DIP	DUCTILE IRON PIPE
DR	DRIVEWAY
ELEV OR EL	ELEVATION
EOP	EDGE OF PAVEMENT
ETW	EDGE OF TRAVELED WAY
EXIST	EXISTING
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN	FOUNDATION
FND	FOUND
FWD	FILLED WITH DEBRIS
GRAN	GRANITE
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HP	HIGH POINT
HYD	HYDRANT
INV	INVERT
LB	LOAM BORROW
LO	LAYOUT
MAX	MAXIMUM
MIN	MINIMUM
MHB	MASSACHUSETTS HIGHWAY BOUND
MHD	MASSACHUSETTS HIGHWAY DEPARTMENT
MLB	MODIFIED LOAM BORROW
MON	MONUMENT
NIC	NOT IN CONTRACT
NGVD	NATIONAL GEODETIC VERTICAL DATUM
N/F	NOW OR FORMERLY
OHW	OVERHEAD WIRE
PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVE
PGL	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
PRC	POINT OF REVERSE CURVE
PROP	PROPOSED
PT	POINT OF TANGENT
PVC	POINT OF VERTICAL CURVE
PVCC	POINT OF VERTICAL COMPOUND CURVE
PVCP	POLYVINYLCHLORIDE PIPE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVRC	POINT OF VERTICAL REVERSE CURVE
PVT	POINT OF VERTICAL TANGENT
PWW	PAVED WATERWAY
R	RADIUS
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
REM	REMOVE
REMOD	REMODEL
RCP	REINFORCED CONCRETE PIPE
RET	RETAIN
ROW	RIGHT OF WAY
RR	RAILROAD
SB	STONE BOUND
SB/DH	STONE BOUND/DRILL HOLE
SHLD	SHOULDER
SHLO	STATE HIGHWAY LAYOUT
SSD	STOPPING SIGHT DISTANCE
STA	STATION
STL	STEEL
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TOS	TOP OF SLOPE
TS	TRAFFIC SIGNAL
TSV & B	TAPPING SLEEVE, VALVE AND BOX
TYP	TYPICAL
TW	TOP OF WALL
UC	UNDER CONSTRUCTION
USGS	U.S. GEOLOGICAL SURVEY
UP	UTILITY POLE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
WCR	WHEELCHAIR RAMP

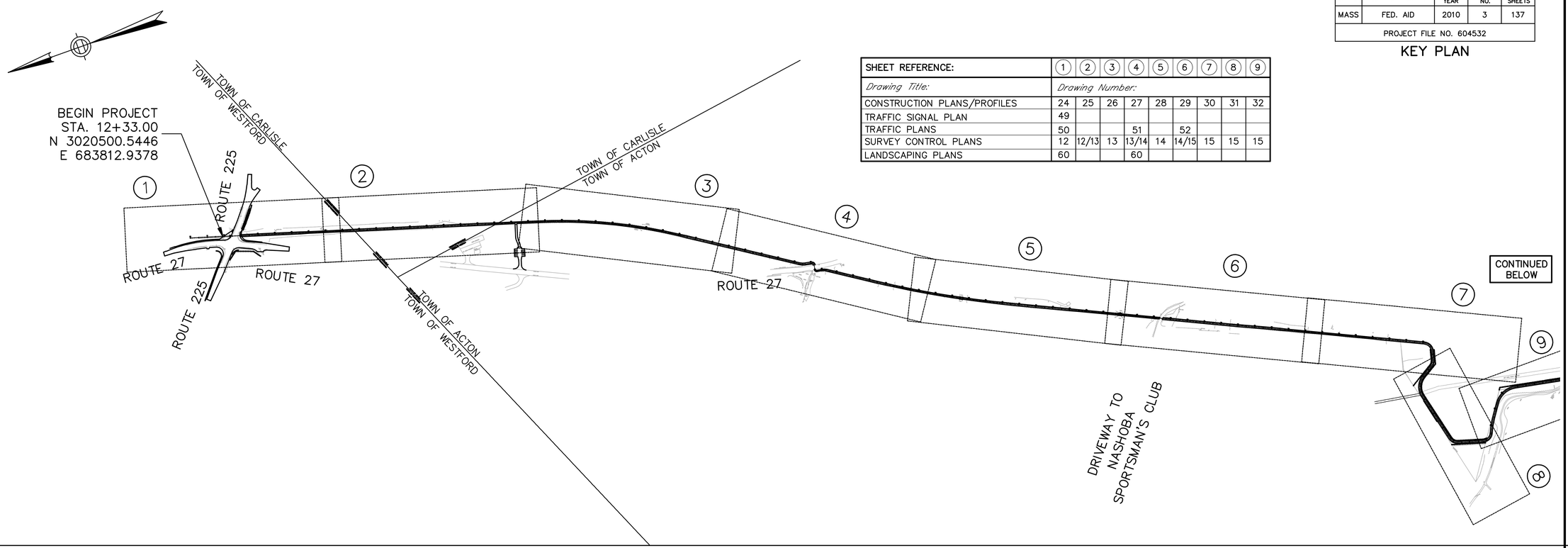
GENERAL NOTES

1. EXISTING CONDITIONS INFORMATION IS BASED ON SURVEY PROVIDED BY JUDITH NITSCH ENGINEERING. ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). ALL SURVEY POINTS HAVE BEEN DETERMINED WITH RESPECT TO THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM AS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83). UNITS ARE ENGLISH.
2. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE EXACTLY AND TO PRESERVE ANY AND ALL UNDERGROUND UTILITIES. CALL "DIG-SAFE" 1-888-DIGSAFE (344-7233) AT LEAST 72 HOURS BEFORE COMMENCING CONSTRUCTION.
3. WHERE AN EXISTING UNDERGROUND UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
4. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
5. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
6. THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS, OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE & RESET" (R&R).
7. ALL EXISTING STATE, COUNTY, CITY AND TOWN LOCATION LINES AND PRIVATE PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND THEIR EXACT LOCATIONS ARE NOT GUARANTEED.
8. ALL TRANVERSE JOINTS, AND ALL LONGITUDINAL JOINTS BETWEEN NEW SURFACE PAVEMENT AND EXISTING SURFACE PAVEMENT TO REMAIN SHALL BE COATED WITH A HOT POURED RUBBERIZED ASPHALT SEALANT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION NUMBER SS-S-1401.
9. ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED SHALL HAVE LOAM BORROW PLACED AND SEEDED. THE LOAM BORROW SHALL HAVE A MINIMUM DEPTH OF 4 INCHES AND SHALL BE PLACED FLUSH WITH THE TOP OF THE ADJACENT CURB, EDGING, BERM OR PAVEMENT SURFACE.
10. THE LIMIT OF WORK AREA SHALL BE THE STREET RIGHT OF WAY UNLESS SHOWN OTHERWISE.
11. ALL PROPERTY LINES BETWEEN ABUTTERS ARE APPROXIMATE ONLY.
12. PRIOR TO THE START OF ANY NEW UTILITY WORK, ALL ELEVATIONS OF EXISTING UTILITIES IN THOSE AREAS ARE TO BE VERIFIED. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES OCCUR.
13. ALL CASTINGS SHALL BE SET FLUSH WITH FINISHED GRADE.
14. ALL GATE BOXES, SERVICE BOXES AND PUBLICLY OWNED MANHOLE FRAMES AND COVERS SHALL BE ADJUSTED TO GRADE BY THE CONTRACTOR.
15. ALL NEW SIDEWALKS AND DRIVEWAY GRADES SHALL MATCH EXISTING GRADES AT BACK OF SIDEWALK LINE UNLESS SHOWN OTHERWISE ON THE PLANS AND CROSS-SECTIONS.
16. THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO PROTECT ALL EXISTING TREES AND ROOTS THAT ARE NOT DESIGNATED FOR REMOVAL.
17. ALL DRAIN MANHOLES AND CATCH BASINS NOTED AS "REM." ON THE PLAN SHALL BE BACKFILLED WITH CONTROLLED DENSITY FILL TYPE 2E.
18. CONTRACTOR TO CONTACT ENGINEER PRIOR TO INSTALLATION OF BOUNDS FOR FINAL LOCATIONS.

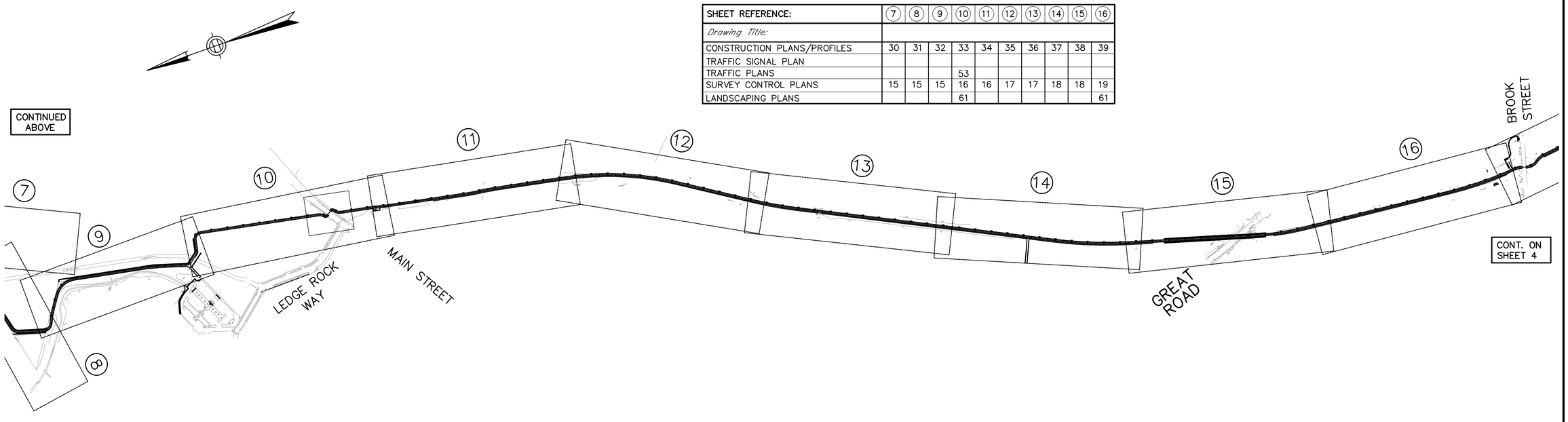
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	3	137
PROJECT FILE NO. 604532				

KEY PLAN



SHEET REFERENCE:	1	2	3	4	5	6	7	8	9
Drawing Title:	*Drawing Number:*								
CONSTRUCTION PLANS/PROFILES	24	25	26	27	28	29	30	31	32
TRAFFIC SIGNAL PLAN	49								
TRAFFIC PLANS	50			51		52			
SURVEY CONTROL PLANS	12	12/13	13	13/14	14	14/15	15	15	15
LANDSCAPING PLANS	60			60					



SHEET REFERENCE:	7	8	9	10	11	12	13	14	15	16
Drawing Title:										
CONSTRUCTION PLANS/PROFILES	30	31	32	33	34	35	36	37	38	39
TRAFFIC SIGNAL PLAN										
TRAFFIC PLANS				53						
SURVEY CONTROL PLANS	15	15	15	16	16	17	17	18	18	19
LANDSCAPING PLANS				61						61

GRAPHIC SCALE
0 150 300 450 600 900 FEET

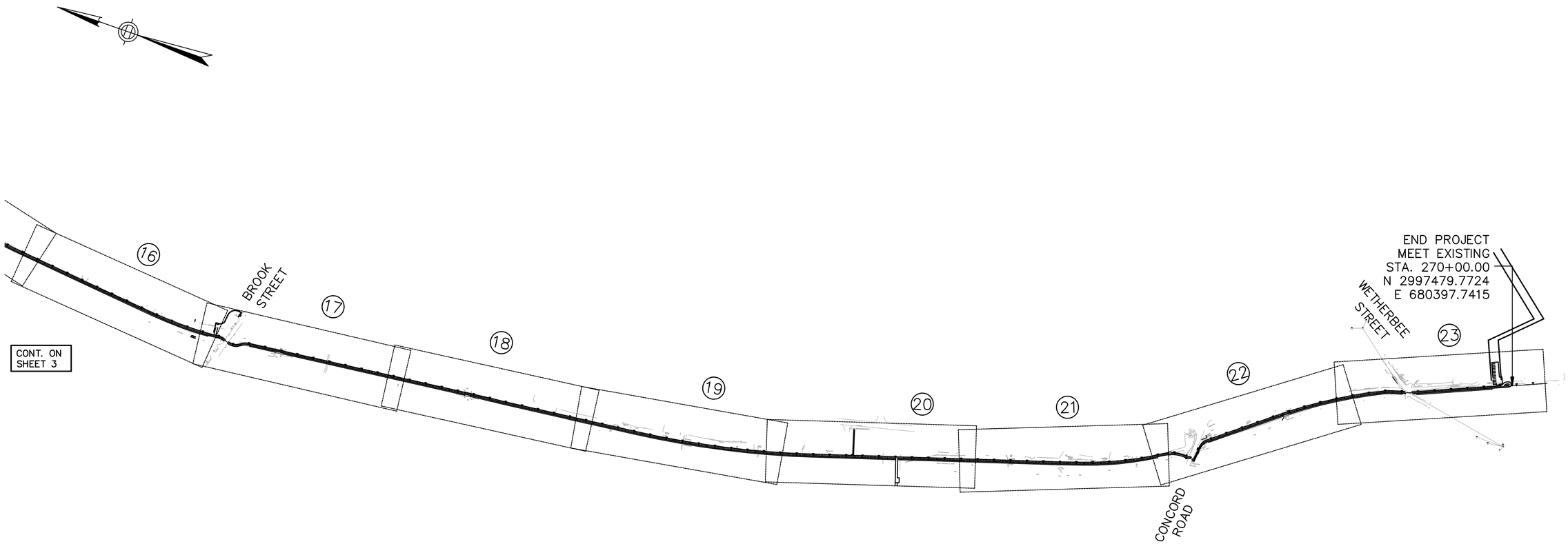
IN CHARGE OF	GJH
DESIGNED BY	CRB
CHECKED BY	GJH
DRAWN BY	CRB
CHECKED BY	GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	4	137
PROJECT FILE NO. 604532				

KEY PLAN



SHEET REFERENCE:	16	17	18	19	20	21	22	23
Drawing Title:	*Drawing Number:*							
CONSTRUCTION PLANS/PROFILES	39	40	41	42	43	44	45	46
TRAFFIC SIGNAL PLAN								
TRAFFIC PLANS		54					55	56
SURVEY CONTROL PLANS	19	19	20	20	21	21	22	22
LANDSCAPING PLANS	61	61				62	62	62

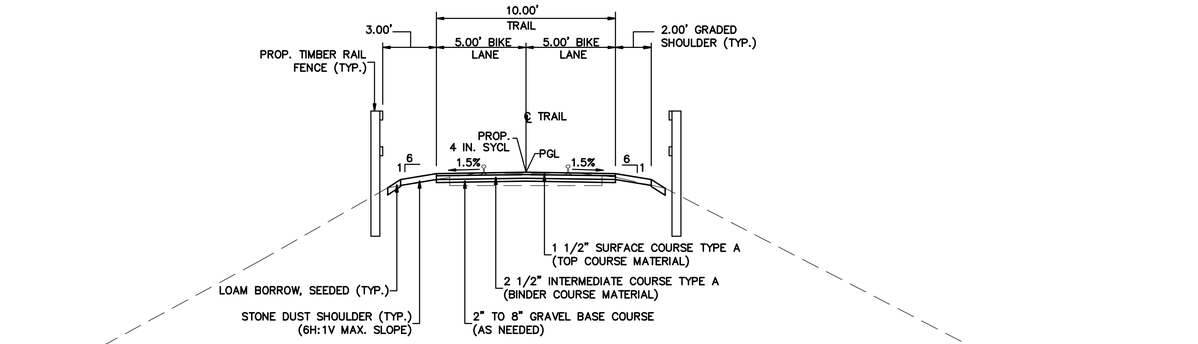
GRAPHIC SCALE
0 150 300 450 600 900FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

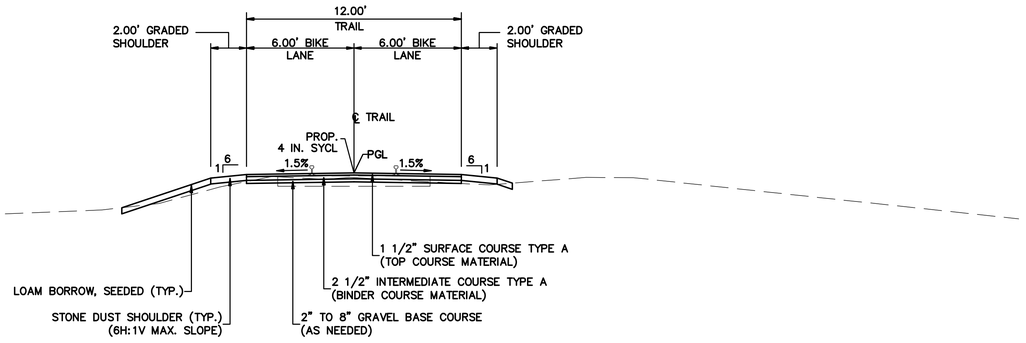
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	5	137
PROJECT FILE NO. 604532				

TYPICAL SECTIONS



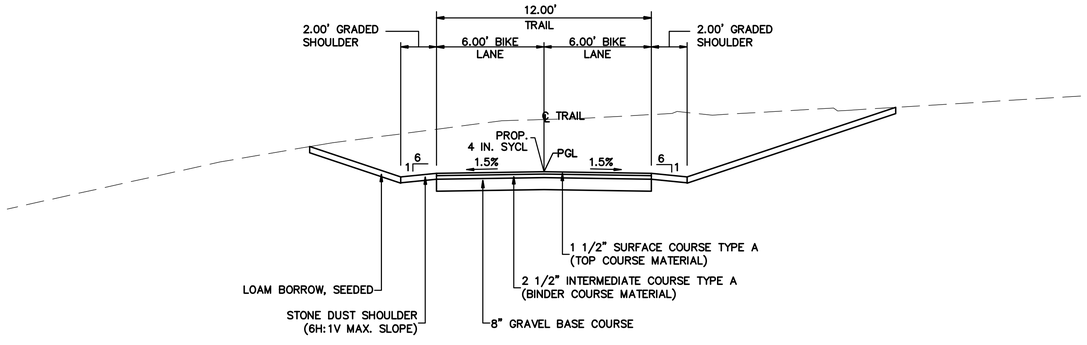
TYPICAL SECTION – 10' WIDE TRAIL WITH FENCE

SCALE 1" = 4'



TYPICAL SECTION – 12' WIDE TRAIL FILL SECTION

SCALE 1" = 4'



TYPICAL SECTION – 12' WIDE TRAIL CUT SECTION

SCALE 1" = 4'

PAVEMENT NOTES

FULL DEPTH HOT MIX ASPHALT BIKE TRAIL

SURFACE COURSE: 1 1/2" SURFACE COURSE TYPE A (TOP COURSE MATERIAL) (ITEM 460.)

INTERMEDIATE COURSE: 2 1/2" INTERMEDIATE COURSE TYPE A (BINDER COURSE MATERIAL) (ITEM 460.)

FOUNDATION: 2" – 8" GRAVEL BORROW (M1.03.0 TYPE b) (ITEM 151.)

SOFT TRAIL AND STONE DUST SHOULDER

SURFACE: 4" STONE DUST (ITEM 458.15) OVER WEED CONTROL FABRIC

FULL DEPTH CONSTRUCTION AND WIDENING GREATER THAN 6 FEET

SURFACE COURSE: 3 1/2" HOT MIX ASPHALT (ITEM 460.)
(1 3/4" HMA SURFACE COURSE MATERIAL TYPE B OVER
1 3/4" HMA INTERMEDIATE COURSE MATERIAL TYPE B)

BASE COURSE: 4" HOT MIX ASPHALT BASE COURSE (ITEM 420.)
PLACED IN ONE LAYER

SUBBASE: 4" DENSE GRADED CRUSHED STONE (ITEM 402.) OVER
8" GRAVEL BORROW (ITEM 151.) (OR TO DEPTH OF
EXISTING GRAVEL SUBBASE, WHICHEVER IS GREATER)

PAVEMENT OVERLAY

TOP COURSE: 1 3/4" HOT MIX ASPHALT (SURFACE COURSE
MATERIAL TYPE B) (ITEM 460.)

LEVELING COURSE: COLD PLANE AS SHOWN ON THE PLANS OR AS REQUIRED TO PROVIDE THE SPECIFIED GRADE OR ALIGNMENT. WHERE REQUIRED, PLACE VARIABLE DEPTH HMA (SURFACE COURSE MATERIAL TYPE B) (ITEM 460.).

TACK COAT: BITUMEN FOR TACK COAT (RS–1) AT 0.05 GAL./S.Y. OVER EXISTING PAVEMENT

CEMENT CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS:

SURFACE COURSE: 4" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)

SUBBASE: 8" GRAVEL BORROW TYPE "B"

FULL DEPTH WIDENING < 6 FEET

SURFACE: 3 1/2" HOT MIX ASPHALT (ITEM 460.)
(1 3/4" HMA SURFACE COURSE MATERIAL TYPE B OVER
1 3/4" HMA INTERMEDIATE COURSE MATERIAL TYPE B)

BASE: 8" HIGH–EARLY–STRENGTH CEMENT CONCRETE BASE COURSE (ITEM 431.1)

SUBBASE: 8" GRAVEL BORROW TYPE "B" (ITEM 151.)

HOT MIX ASPHALT WALKS

SURFACE: 2 1/2" HOT MIX ASPHALT
(1 1/4" SURFACE COURSE MATERIAL TYPE B
OVER 1 1/4" INTERMEDIATE COURSE MATERIAL TYPE B)

SUBBASE: 8" GRAVEL BORROW TYPE "B"

HOT MIX ASPHALT PARKING LOTS

SURFACE COURSE: 2" SURFACE COURSE TYPE A (TOP COURSE MATERIAL) (ITEM 460.)

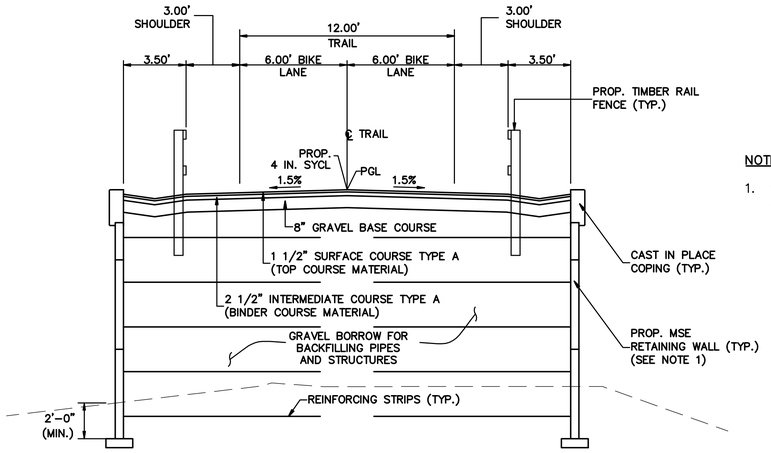
INTERMEDIATE COURSE: 3" INTERMEDIATE COURSE TYPE A (BINDER COURSE MATERIAL) (ITEM 460.)

FOUNDATION: 8" GRAVEL BORROW (M1.03.0 TYPE b) (ITEM 151.)

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY MJE
CHECKED BY GJH

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	6	137
PROJECT FILE NO. 604532				

TYPICAL SECTIONS

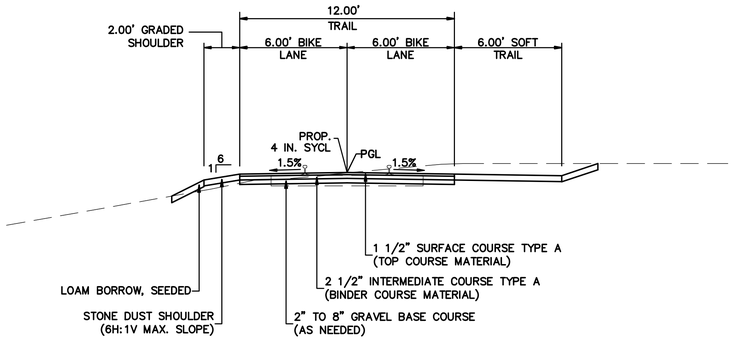


NOTE:

1. WALL IS SHOWN FOR INFORMATIONAL PURPOSES ONLY. ACTUAL DESIGN IS TO BE PROVIDED BY THE CONTRACTOR.

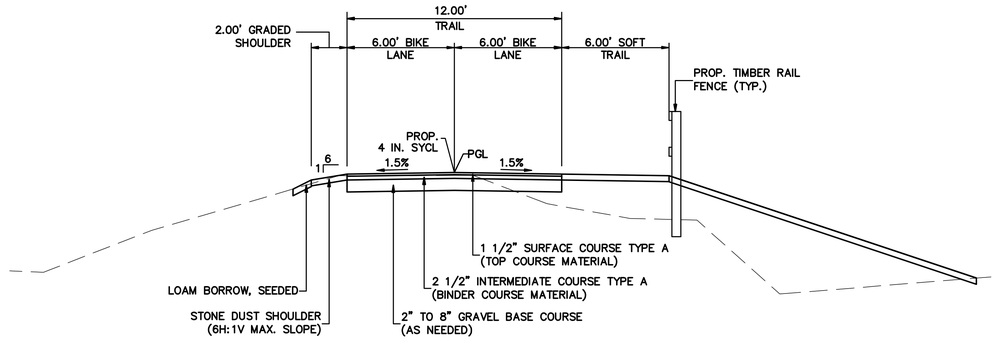
TYPICAL SECTION – 12' WIDE TRAIL
STA 166+50 TO STA 170+78.83
STA 171+85.55 TO STA 173+00

SCALE 1" = 4'



TYPICAL SECTION – 12' WIDE TRAIL
WITH SOFT TRAIL AND NO FENCE

SCALE 1" = 4'



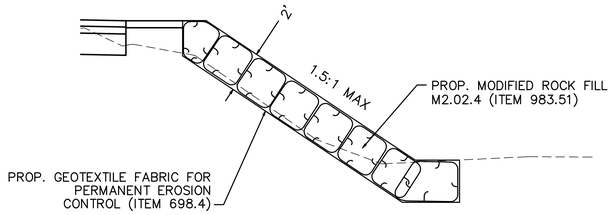
TYPICAL SECTION – 12' WIDE TRAIL
WITH SOFT TRAIL AND FENCE

SCALE 1" = 4'

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY MJE
CHECKED BY GJH

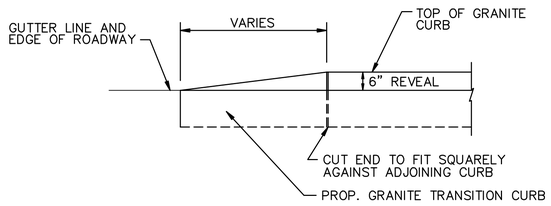
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	7	137
PROJECT FILE NO. 604532				

CONSTRUCTION DETAILS



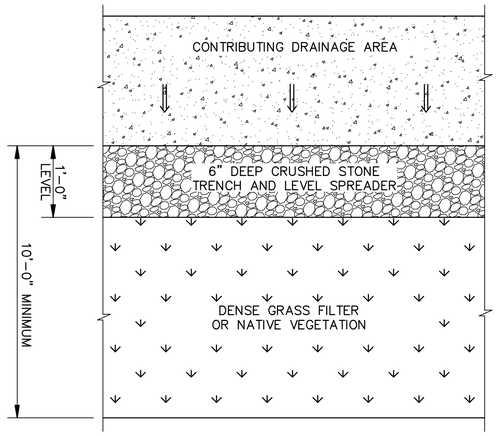
MODIFIED ROCK FILL

FOR SLOPES STEEPER THAN 2H TO 1V
N.T.S.

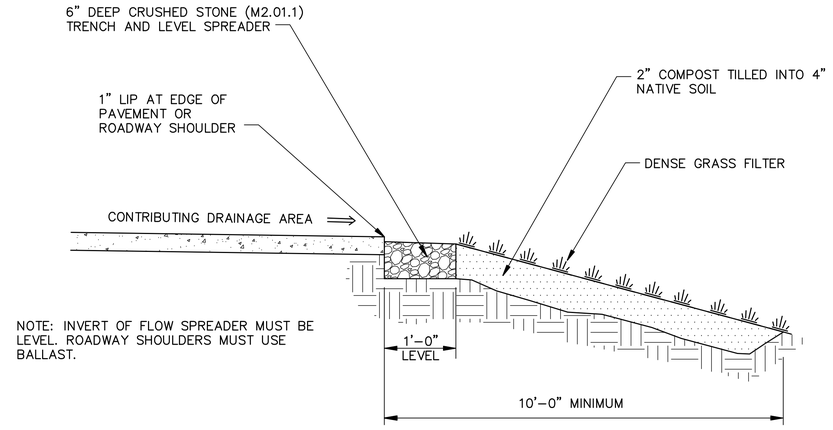


TRANSITION CURB DETAIL

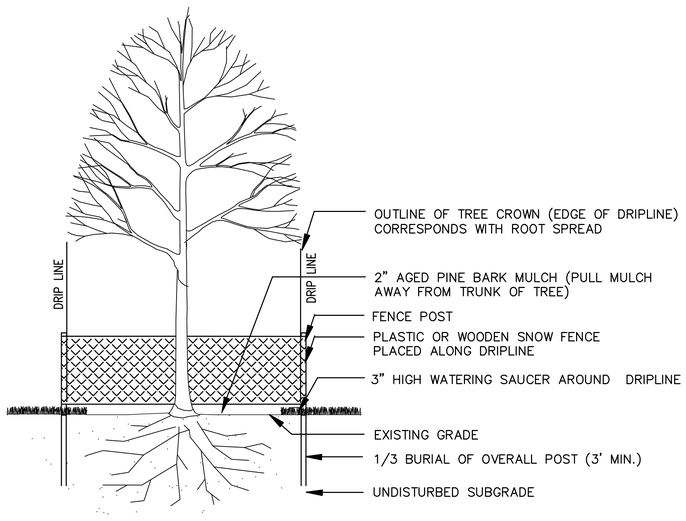
(ITEM 509.)
TO BE USED AT ALL LOCATIONS WHERE
VERTICAL GRANITE CURB ENDS



PLAN



SECTION



TREE PROTECTION

N.T.S.

FILTER STRIP DETAILS

N.T.S.

CONSTRUCTION OF FILTER STRIP

SOIL AMENDMENT

1. 2" (MINIMUM) OF STABLE AND MATURE COMPOST SHALL BE PROVIDED FOR THE ENTIRE FILTER STRIP TREATMENT AREA TO AMEND THE TOPSOIL UNLESS THE SOIL ALREADY HAS AN ORGANIC CONTENT OF 5% OR GREATER. THE COMPOST MUST BE TILLED INTO THE UNDERLYING NATIVE SOIL TO A DEPTH OF 4" TO PREVENT WASHING OUT THE COMPOST AND AVOID CREATING A DEFINED LAYER OF DIFFERENT SOIL TYPES THAT CAN PREVENT DOWNWARD PERCOLATION OF WATER.
   a. COMPOST SHALL BE PER THE STANDARD SPECIFICATIONS

CONSTRUCTION CONSIDERATIONS

1. PROVIDE EROSION CONTROL BEFORE CONSTRUCTION–PHASE SEDIMENT ENTERS THE FILTER STRIP. COMPOST BERMS MAY BE USED FOR EROSION CONTROL DURING CONSTRUCTION OF THE FILTER STRIPS. FILTER STRIPS ARE DESIGNED TO HANDLE ONLY MODEST SEDIMENT LOADS WITHOUT FREQUENT MAINTENANCE.
2. FILTER STRIP MUST BE PROTECTED DURING CONSTRUCTION. IF CONSTRUCTION SEDIMENTS IMPACT FILTER STRIP, CONTRACTOR SHALL RECONSTRUCT FILTER STRIP AND RE–ESTABLISH VEGETATION OF THE STRIP TO THE SATISFACTION OF THE ENGINEER.
3. RUNOFF SHALL BE DIVERTED AROUND A FILTER STRIP UNTIL THE GRASS IS ESTABLISHED PER SPECIFICATIONS.

MAINTENANCE DURING CONSTRUCTION

1. IRRIGATION SHALL BE PROVIDED AS NECESSARY IN THE MONTHS FOLLOWING INITIAL FILTER STRIP CONSTRUCTION TO PREVENT THE FILTER STRIP GRASS FROM WILTING OR DYING.
2. IF WEEDS GROW TO A HEIGHT OF 12", THE CONTRACTOR SHALL MOW FOR WEED CONTROL.
3. THE CONTRACTOR SHALL MAINTAIN THE FILTER STRIP AT A HEIGHT OF 4" – 6" UNTIL ACCEPTANCE.

PLANTING REQUIREMENTS

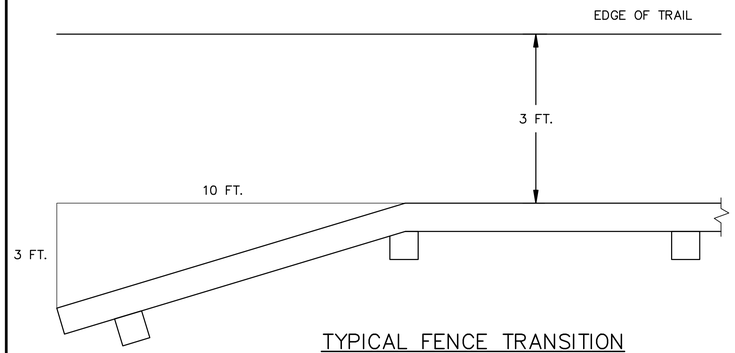
1. GRASS SHALL BE ESTABLISHED THROUGHOUT THE ENTIRE TREATMENT AREA OF THE FILTER STRIP AS SPECIFIED IN THE SPECIAL PROVISIONS.
2. THE FOLLOWING PERMANENT EROSION–CONTROL GRASS SEED MIX SHALL BE APPLIED AT A RATE OF 25 LBS/AC IN FILTER STRIPS (PERCENTAGES ARE BY WEIGHT):
   - 20% BIG BLUESTEM
   - 15% CREEPING RED FESCUE
   - 10% LITTLE BLUESTEM
   - 10% CANADA WILD RYE
   - 10% VIRGINIA WILD RYE
   - 7% SWITCH GRASS
   - 7% PARTRIDGE PEA
   - 7% SHOWY TICK TREFOIL
   - 7% FRINGED BROME GRASS
   - 7% DEER TONGUE
3. ALTERNATE SEED MIX AND EROSION CONTROL MEASURES MAY BE USED IF RECOMMENDED BY THE EROSION CONTROL SPECIALIST AND APPROVED BY THE ENGINEER.
4. SEED MAY BE APPLIED BY HYDROSEEDING OR BROADCAST APPLICATION.
5. SEEDING PERIOD SHALL BE SPRING (MID–MARCH TO JUNE) OR FALL (LATE SEPTEMBER TO OCTOBER). IF SEED IS APPLIED IN THE SPRING OR SUMMER, PROVIDE IRRIGATION AS NECESSARY TO ENSURE GRASS SURVIVAL.

IN CHARGE OF
DESIGNED BY GJH
CHECKED BY BM
DRAWN BY GJH
CHECKED BY BM
GJH

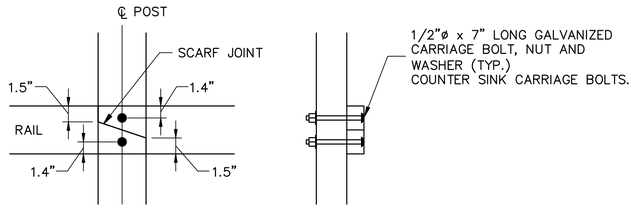
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	8	137
PROJECT FILE NO. 604532				

CONSTRUCTION DETAILS

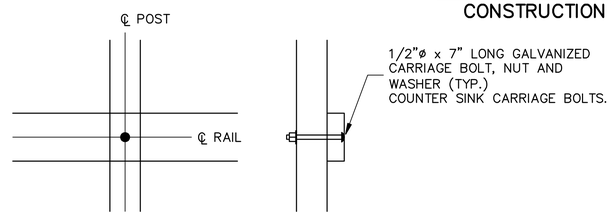


TYPICAL FENCE TRANSITION
AT FENCE APROACHES
N.T.S.



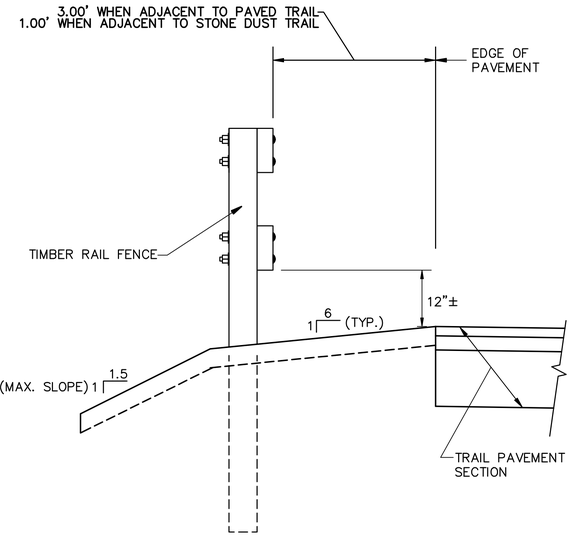
ELEVATION SECTION

SCARF JOINT CONNECTION
N.T.S.



ELEVATION SECTION

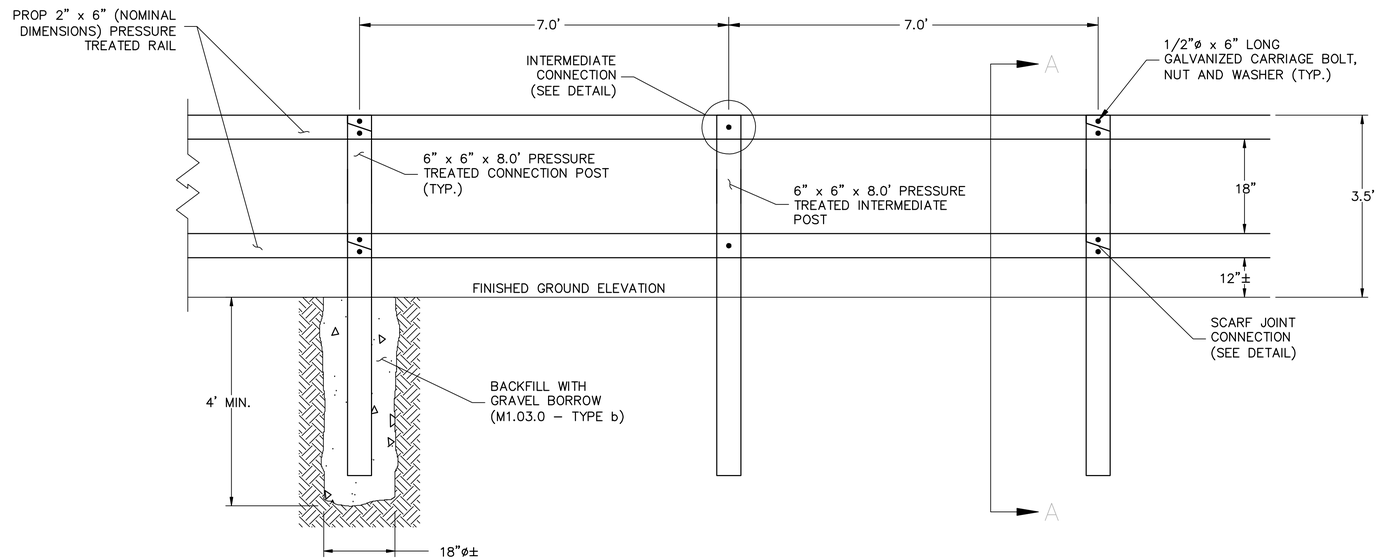
INTERMEDIATE CONNECTION
N.T.S.



SECTION A–A

SUGGESTED TIMBER RAIL FENCE CONSTRUCTION SEQUENCE

1. AUGER OR DIG POST HOLE TO REQUIRED DIMENSIONS.
2. BACKFILL BOTTOM 6"± OF HOLE WITH GRAVEL AND COMPACT THOROUGHLY.
3. SET POST AND HOLD PLUMB DURING BACKFILLING.
4. BACKFILL WITH GRAVEL IN 12" LIFTS. COMPACT EACH LIFT THOROUGHLY.
5. CLAMP RAILS TO POSTS AND FIELD DRILL BOLT HOLES.
6. SET BOLTS, WASHERS AND NUTS.
7. IF CCA PRESSURE TREATED LUMBER IS NOT READILY AVAILABLE AT THE TIME OF CONSTRUCTION OR IT IS DEEMED ENVIRONMENTALLY UNACCEPTABLE FOR COMMERCIAL USES BY THE EPA, USE ACQ PRESSURE TREATED LUMBER.



TIMBER RAIL FENCE ELEVATION
N.T.S.
SEE PLANS FOR LOCATIONS

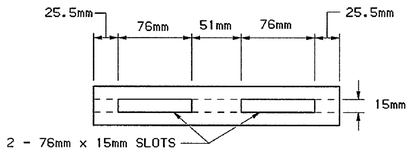
NOTE:
FOR RADII LESS THAN 165', USE CONNECTION POSTS SET AT 7.0' O.C. AND SHORTEN RAILS ACCORDINGLY.

IN CHARGE OF GJH
DESIGNED BY BM
CHECKED BY GJH
DRAWN BY BM
CHECKED BY GJH

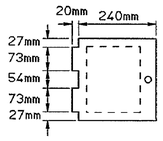
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	9	137
PROJECT FILE NO. 604532				

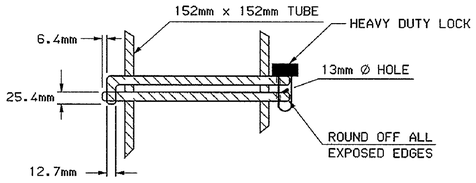
CONSTRUCTION DETAILS



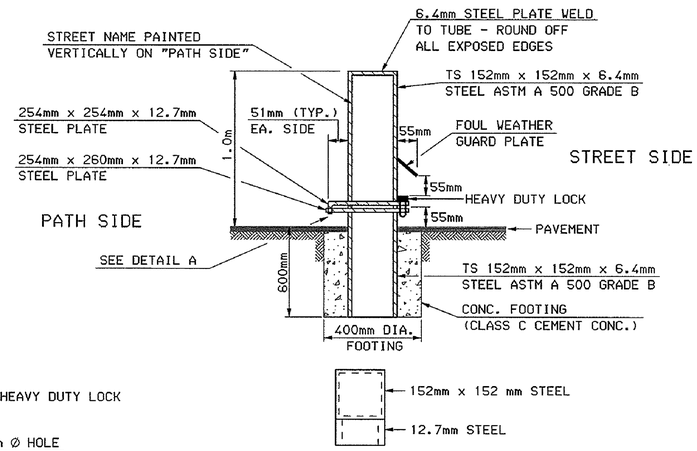
TOP PLATE EDGE DETAIL



BOTTOM PLATE DETAIL



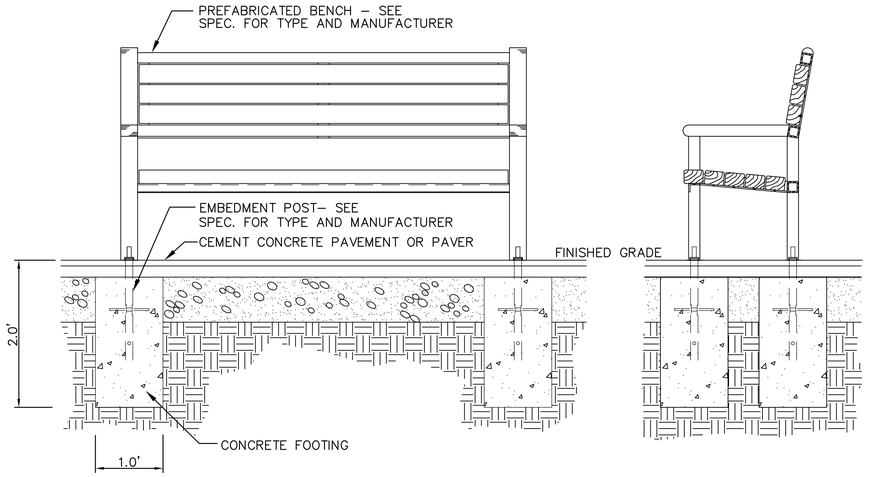
DETAIL A



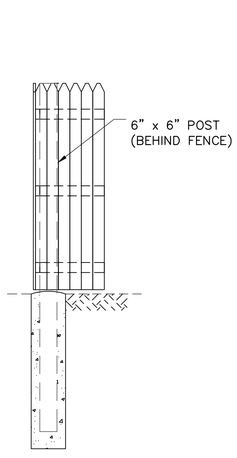
FOUL WEATHER GUARD
DETAIL - PLAN VIEW

NOTE: PAINT
1. PRIMER COAT - BASIC ZINC SILICO CHROMATE PAINT
2. FINAL COAT - BRIGHT YELLOW ENAMEL FOR VISIBLILITY
3. STREET NAME - BRIGHT BLACK ENAMEL

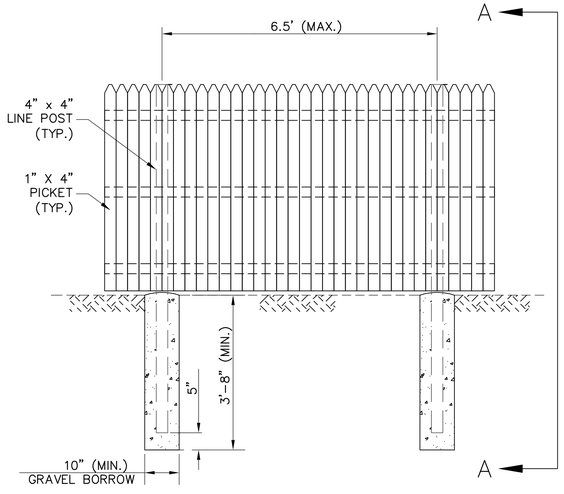
REMOVABLE BOLLARD
N.T.S.
SEE PLANS FOR LOCATIONS



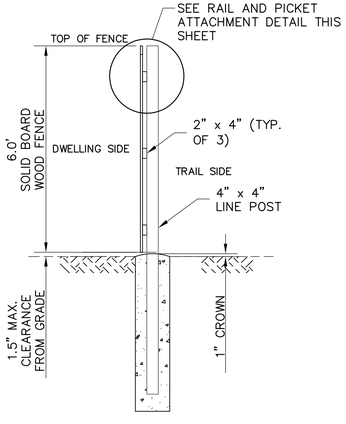
BENCH
N.T.S.



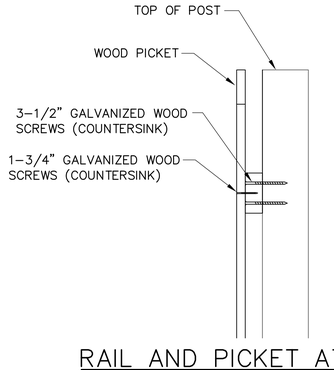
CORNER POST
SCALE: N.T.S.



ELEVATION
SCALE: N.T.S.



SECTION A-A
SCALE: N.T.S.



RAIL AND PICKET ATTACHMENT DETAIL
SCALE: N.T.S.

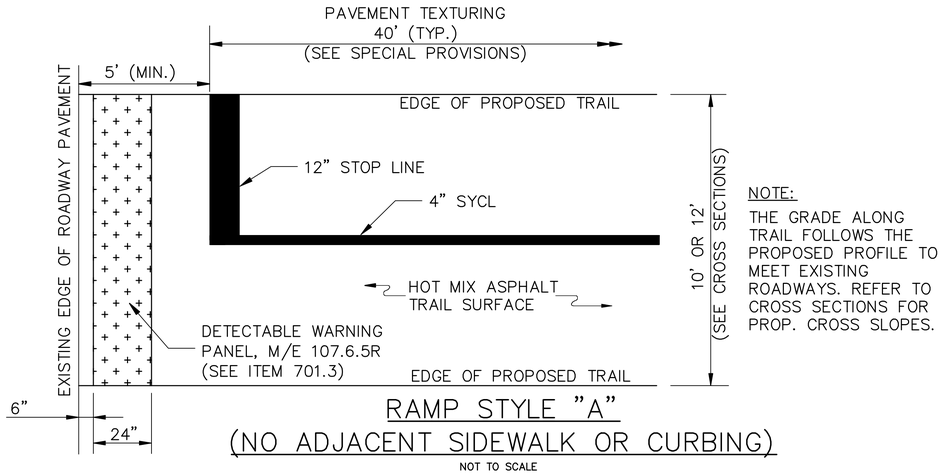
TYPICAL STOCKADE FENCING

1. ALL WOOD FENCE POSTS AND RAILS TO BE NO. 2 PINE PRESSURE TREATED LUMBER.
2. PICKETS TO BE 1" THICK CEDAR. CORNER AND GATE POSTS TO BE 6" X 6" NO. 2 PINE PRESSURE TREATED LUMBER.
3. LINE POSTS TO BE 100mmX100mm NO. 2 PINE PRESSURE TREATED LUMBER.
4. ALL HARDWARE TO BE HOT DIP GALVANIZED.
5. PICKETS SHALL ALWAYS FACE DWELLINGS.

IN CHARGE OF GJH
DESIGNED BY BM
CHECKED BY GJH
DRAWN BY BM
CHECKED BY GJH

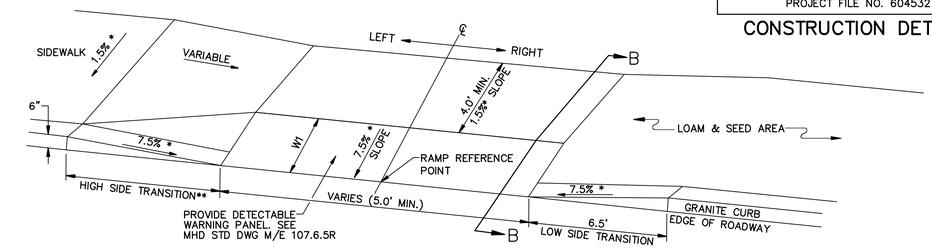
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	10	137
PROJECT FILE NO. 604532				

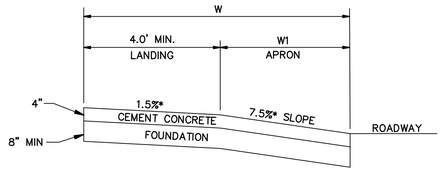
CONSTRUCTION DETAILS



NOTE:
THE GRADE ALONG TRAIL FOLLOWS THE PROPOSED PROFILE TO MEET EXISTING ROADWAYS. REFER TO CROSS SECTIONS FOR PROP. CROSS SLOPES.

RAMP STYLE "A"
(NO ADJACENT SIDEWALK OR CURBING)
NOT TO SCALE



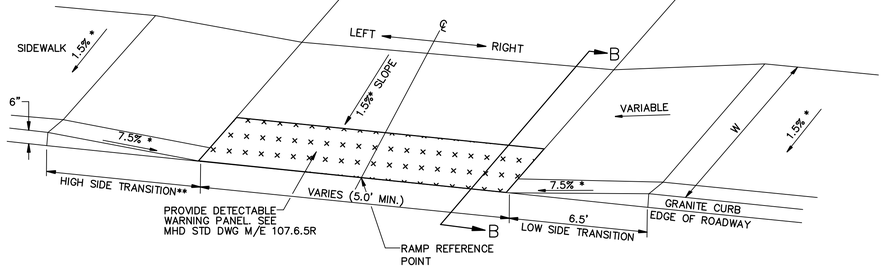


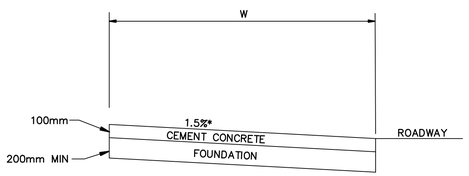
SECTION B–B

NOTES:
* CONSTRUCTION TOLERANCE ±0.5%
SEE CONSTRUCTION STANDARD M/E 107.2.0
** SEE CONSTRUCTION STANDARD M/E 107.9.0

WCR #	RAMP REFERENCE POINT		LENGTH OF PRIMARY RAMP (W1)	WIDTH OF SIDEWALK (W)	WIDTH OF RAMP ENTRANCE MIN. 5.0'	DEPTH OF LEVEL LANDING MIN. 4.0'	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
	STATION	OFFSET						LEFT SIDE	RIGHT SIDE

WHEELCHAIR RAMP STYLE "C"
NOT TO SCALE





NOTES:
* CONSTRUCTION TOLERANCE ±0.5%
SEE CONSTRUCTION STANDARD M/E 107.2.0
** SEE CONSTRUCTION STANDARD M/E 107.9.0

SECTION B–B

WCR #	RAMP REFERENCE POINT		WIDTH OF SIDEWALK (W)	WIDTH OF RAMP ENTRANCE MIN. 5.0'	DEPTH OF LEVEL LANDING MIN. 4.0'	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
	STATION	OFFSET					LEFT SIDE	RIGHT SIDE

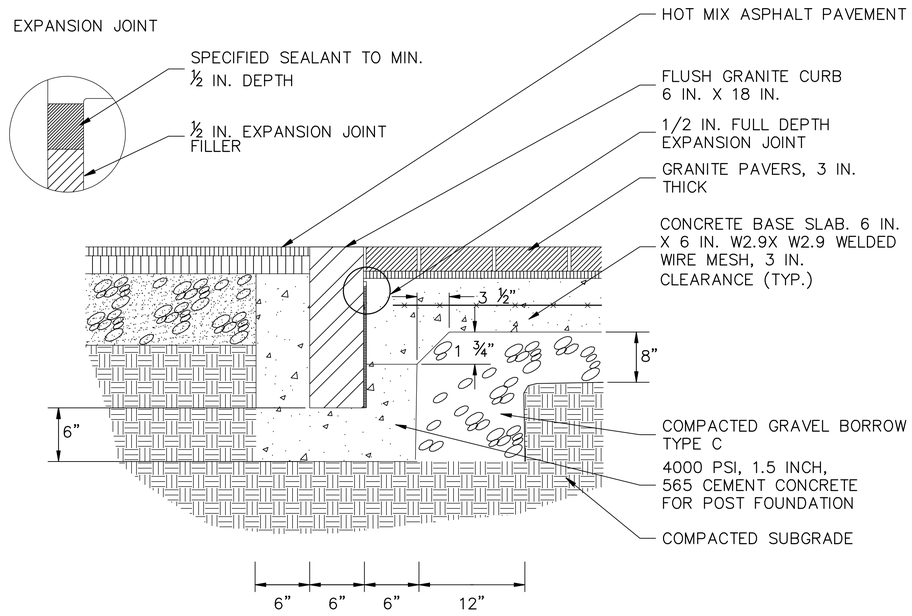
WHEELCHAIR RAMP STYLE "B"
NOT TO SCALE

IN CHARGE OF	GJH
DESIGNED BY	BM
CHECKED BY	GJH
DRAWN BY	BM
CHECKED BY	GJH

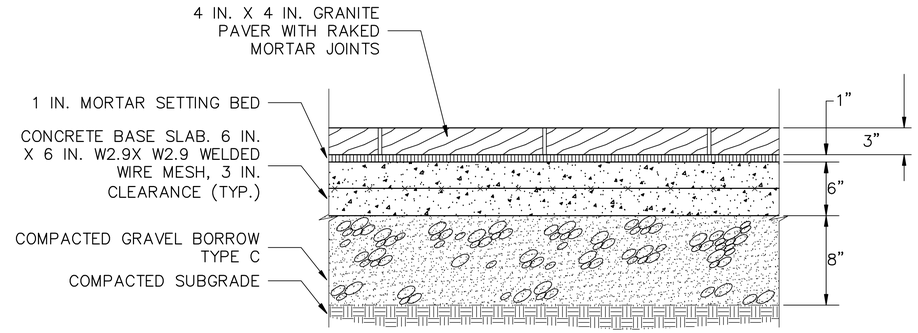
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	11	137
PROJECT FILE NO. 604532				

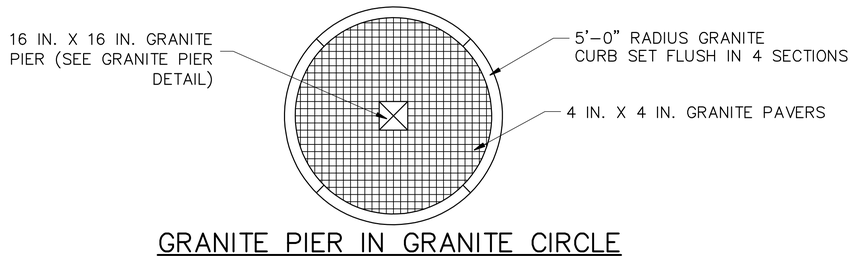
CONSTRUCTION DETAILS



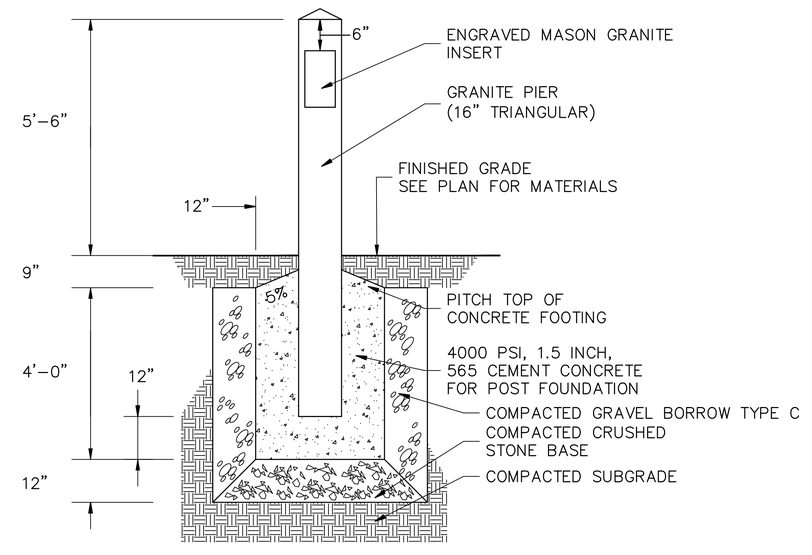
FLUSH GRANITE CURB
N.T.S.



GRANITE PAVERS
N.T.S.



GRANITE PIER IN GRANITE CIRCLE
(PROP. AT STA. 103+98 & 247+75)
N.T.S.



GRANITE PIER
N.T.S.

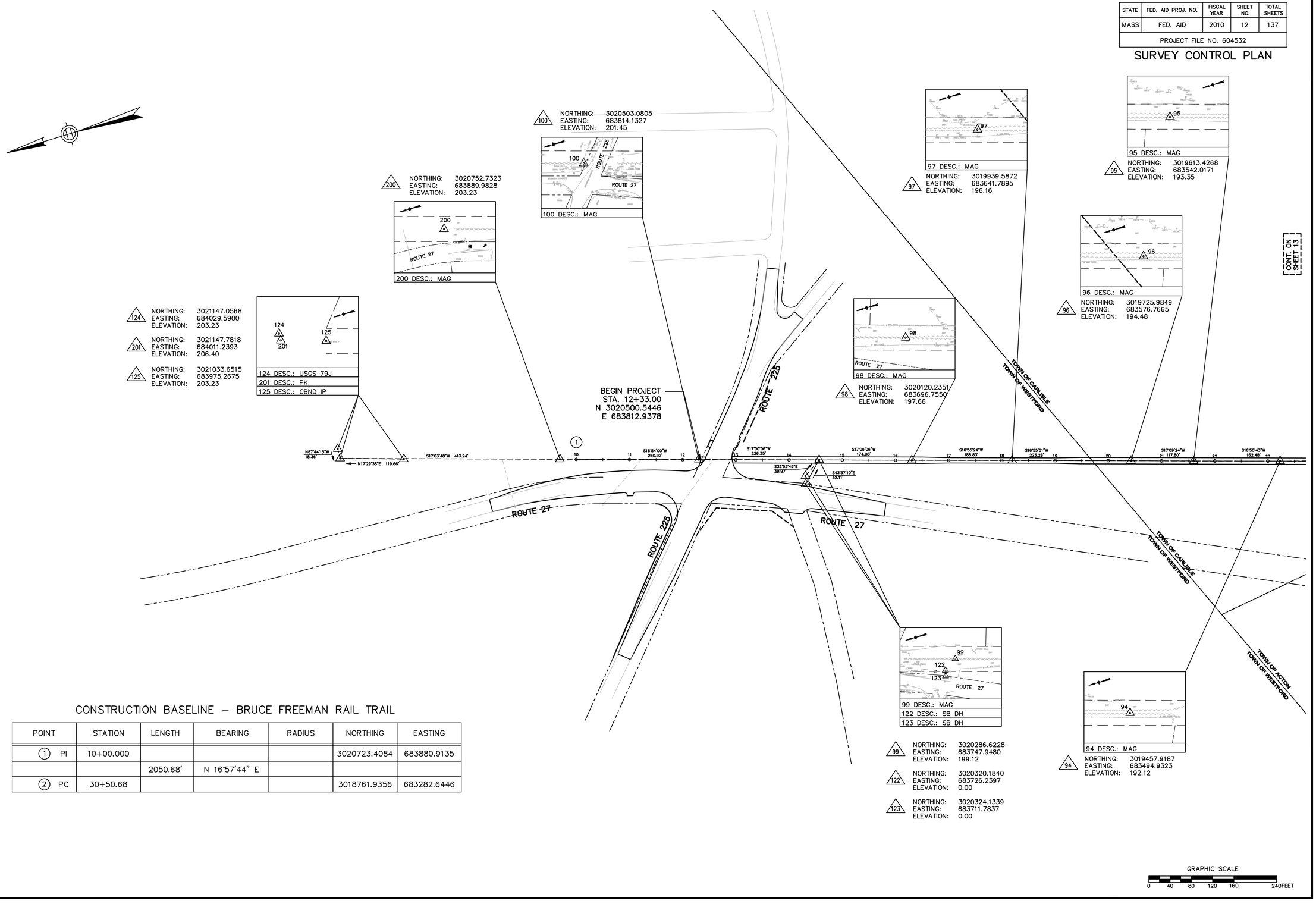
IN CHARGE OF GJH
DESIGNED BY BM
CHECKED BY GJH
DRAWN BY BM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	12	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN



CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(1) PI	10+00.000				3020723.4084	683880.9135
		2050.68'	N 16°57'44" E			
(2) PC	30+50.68				3018761.9356	683282.6446

GRAPHIC SCALE
0 40 80 120 160 240FEET

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	13	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN

CONT. ON SHEET 12

CONT. ON SHEET 14

121 NORTHING: 3019348.7836
EASTING: 683453.1676
ELEVATION: 0.00

121 DESC.: SB DH

93 NORTHING: 3019167.3878
EASTING: 683410.2883
ELEVATION: 189.52

120 NORTHING: 3019104.3402
EASTING: 683405.1088
ELEVATION: 191.43

93 DESC.: MAG
120 DESC.: USGS 79H

92 NORTHING: 3018869.1070
EASTING: 683316.1944
ELEVATION: 186.72

119 NORTHING: 3018770.3937
EASTING: 683336.8926
ELEVATION: 0.00

118 NORTHING: 3018783.8725
EASTING: 683295.7589
ELEVATION: 0.00

117 NORTHING: 3018737.2252
EASTING: 683275.5256
ELEVATION: 0.00

91 NORTHING: 3018648.7828
EASTING: 683246.6312
ELEVATION: 184.21

92 DESC.: MAG
119 DESC.: SB DH
118 DESC.: IP
117 DESC.: SB IP
91 DESC.: MAG

310 NORTHING:
EASTING:
ELEVATION

311 NORTHING: 3017645.1116
EASTING: 682989.5675
ELEVATION: 187.12

312 NORTHING: 3017678.1254
EASTING: 683117.5118
ELEVATION: 196.98

313 NORTHING: 3017782.4442
EASTING: 683048.8271
ELEVATION: 187.99

310 DESC.: HUB/TACK
311 DESC.: HUB/TACK
312 DESC.: HUB/TACK
313 DESC.: HUB/TACK

86 NORTHING: 3017582.3310
EASTING: 682662.6707
ELEVATION: 175.41

86 DESC.: MAG

S16°50'43"W 162.48'
S16°14'35"W 302.81'
S13°17'59"E 186.40'
S04°41'47"E 43.26'
S17°30'29"W 312.77'
N11°50'32"W 100.56'
N13°28'53"E 87.65'
N17°08'18"E 138.01'
S17°31'21"W 231.04'
S19°25'49"W 168.55'
S23°55'17"W 167.59'
S27°08'17"W 174.04'
N28°45'28"E 261.78'
N31°57'18"E 202.36'
S31°56'17"W 419.39'
S33°05'24"W 280.67'
S35°10'36"W 248.55'
S32°31'32"W 274.38'
TOWN OF CARLISLE
TOWN OF ACTON
ROUTE 27
ROUTE 27
ROUTE 27
PC +31.00
PCC +66.96
PRC +01.76
POT +30.00
POT +98.00

90 NORTHING: 3018489.8323
EASTING: 683190.5614
ELEVATION: 183.07

89 NORTHING: 3018336.6424
EASTING: 683122.6085
ELEVATION: 181.85

90 DESC.: MAG
89 DESC.: MAG

88 NORTHING: 3018181.7581
EASTING: 683043.2202
ELEVATION: 180.57

88 DESC.: MAG

115 NORTHING: 3018010.0629
EASTING: 682936.1204
ELEVATION: 0.00

116 NORTHING: 3017954.4970
EASTING: 682913.2890
ELEVATION: 178.16

314 NORTHING: 3017903.3105
EASTING: 682973.8747
ELEVATION: 148.23

87 NORTHING: 3017825.8568
EASTING: 682821.3628
ELEVATION: 177.44

115 DESC.: SB IP
116 DESC.: SB USGS 79G
314 DESC.: HUB/TACK
87 DESC.: MAG

85 NORTHING: 3017379.1750
EASTING: 682519.4837
ELEVATION: 173.96

85 DESC.: HUB/TACK

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(2) PC	30+50.68				3018761.9356	683282.6446
		856.66'		3049.00'		
(3) PT	39+07.35				3017988.1575	682921.6402
		723.66'	N 33°03'37" E			
(4) PC	46+31.00				3017381.6634	682526.8694
		35.95'		100.00'		
(5) PCC	46+66.96				3017348.6879	682513.0346
		134.80'		1202.23'		
(6) PRC	48+01.76				3017215.7092	682491.3814
		15.63'		10.00'		
(7) PT	48+17.39				3017206.8083	682480.4638

GRAPHIC SCALE
0 40 80 120 160 240FEET

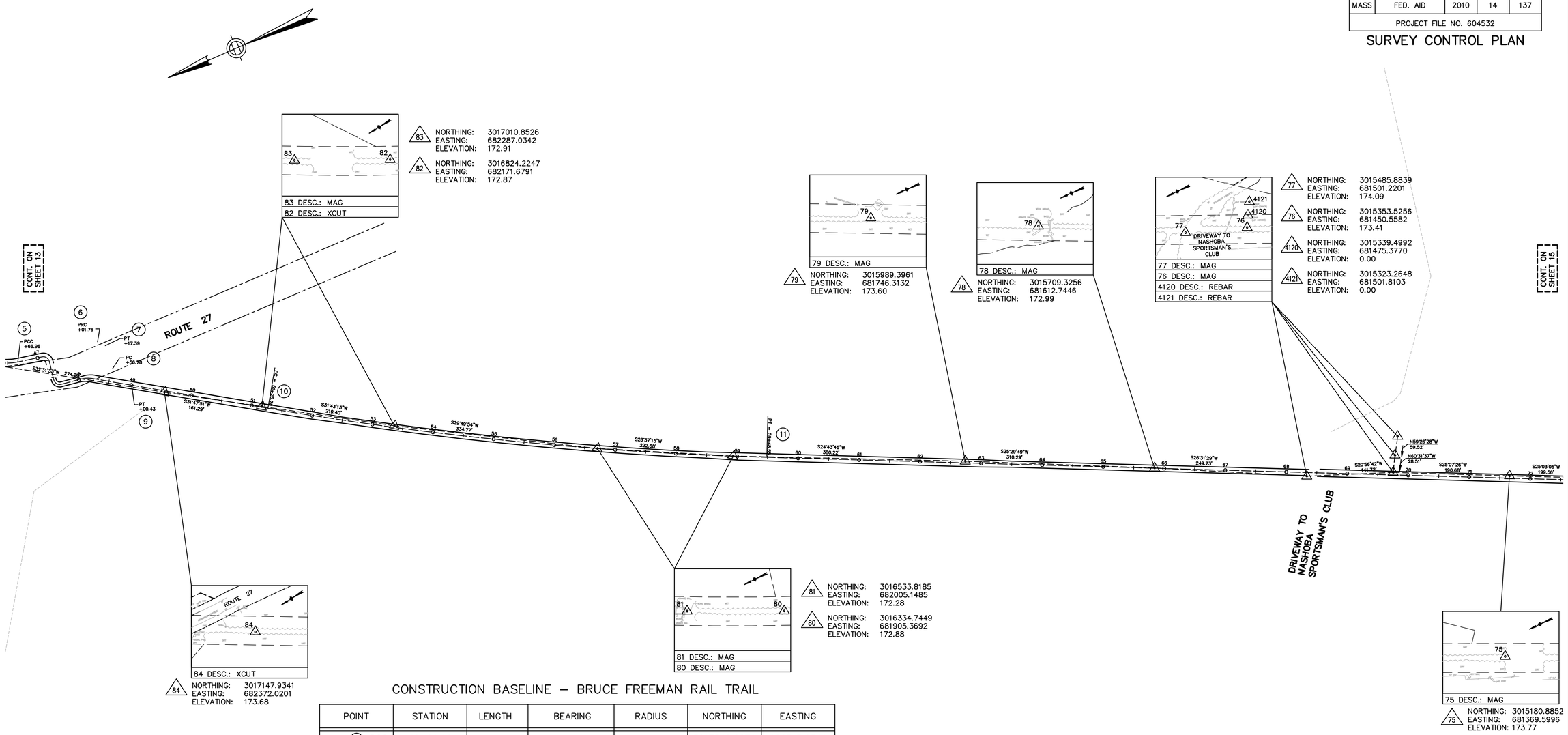
IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	14	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN



CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(5) PCC	46+66.96				3017348.6879	682513.0346
		134.80'		1202.23'		
(6) PRC	48+01.76				3017215.7092	682491.3814
		15.63'		10.00'		
(7) PT	48+17.39				3017206.8083	682480.4638
		39.39'	N 84°24'57" E			
(8) PC	48+56.78				3017210.6416	682441.2572
		43.65'		40.00'		
(9) PT	49+00.43				3017192.6523	682403.8410
		226.35'	N 33°03'37" E			
(10) PC	51+26.78				3017002.9478	682280.3611
		821.77'		5883.00'		
(11) PT	59+48.55				3016285.2021	681881.5472
		1352.39'	S 25°03'25" W			
(12) ⊲PNT	73+00.95				3015060.0860	681308.7830

GRAPHIC SCALE
0 40 80 120 160 240FEET

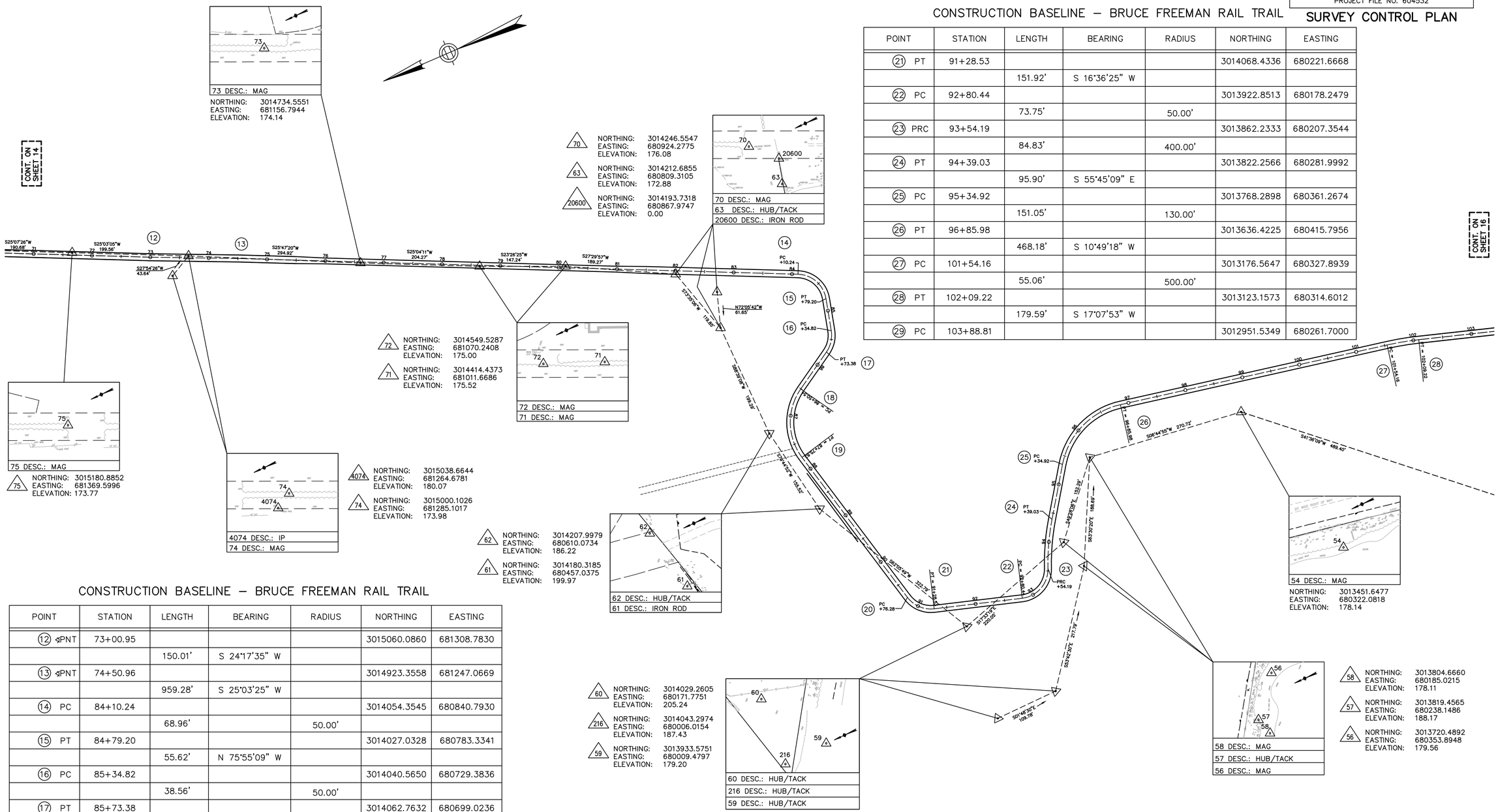
IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	15	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN



CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(12) ⊲PNT	73+00.95				3015060.0860	681308.7830
		150.01'	S 24°17'35" W			
(13) ⊲PNT	74+50.96				3014923.3558	681247.0669
		959.28'	S 25°03'25" W			
(14) PC	84+10.24				3014054.3545	680840.7930
		68.96'		50.00'		
(15) PT	84+79.20				3014027.0328	680783.3341
		55.62'	N 75°55'09" W			
(16) PC	85+34.82				3014040.5650	680729.3836
		38.56'		50.00'		
(17) PT	85+73.38				3014062.7632	680699.0236
		77.15'	N 31°44'06" W			
(18) PC	86+50.54				3014128.3813	680658.4417
		125.29'		100.00'		
(19) PT	87+75.83				3014173.0101	680550.0101
		300.45'	S 76°28'39" W			
(20) PC	90+76.28				3014102.7574	680257.8899
		52.25'		50.00'		

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(21) PT	91+28.53				3014068.4336	680221.6668
		151.92'	S 16°36'25" W			
(22) PC	92+80.44				3013922.8513	680178.2479
		73.75'		50.00'		
(23) PRC	93+54.19				3013862.2333	680207.3544
		84.83'		400.00'		
(24) PT	94+39.03				3013822.2566	680281.9992
		95.90'	S 55°45'09" E			
(25) PC	95+34.92				3013768.2898	680361.2674
		151.05'		130.00'		
(26) PT	96+85.98				3013636.4225	680415.7956
		468.18'	S 10°49'18" W			
(27) PC	101+54.16				3013176.5647	680327.8939
		55.06'		500.00'		
(28) PT	102+09.22				3013123.1573	680314.6012
		179.59'	S 17°07'53" W			
(29) PC	103+88.81				3012951.5349	680261.7000

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

GRAPHIC SCALE
0 40 80 120 160 240FEET

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	16	137
PROJECT FILE NO. 604532				

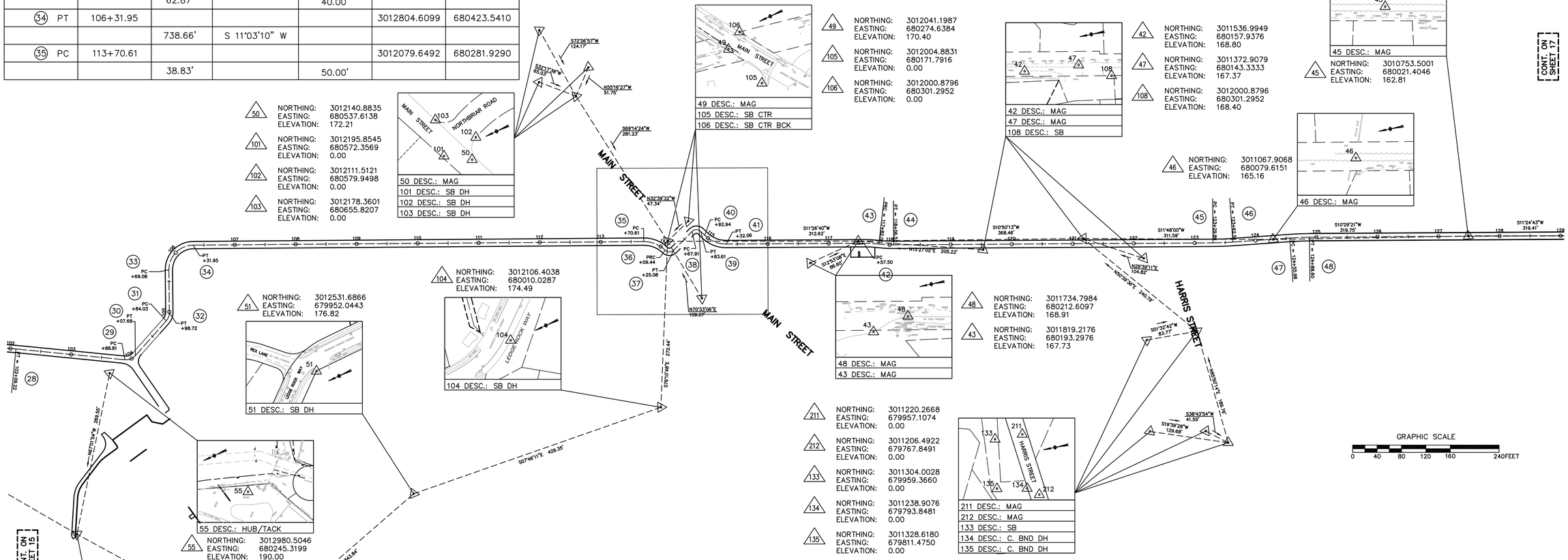
SURVEY CONTROL PLAN

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(28) PT	102+09.22				3013123.1573	680314.6012
		179.59'	S 17°07'53" W			
(29) PC	103+88.81				3012951.5349	680261.7000
		18.86'		20.00'		
(30) PT	104.07.68				3012933.6330	680264.8206
		76.35'	S 36°54'29" E			
(31) PC	104+84.03				3012872.5842	680310.6705
		14.69'		20.00'		
(32) PT	104+98.72				3012864.9620	680322.8482
		70.35'	S 79°00'20" E			
(33) PC	105+69.08				3012851.5442	680391.9116
		62.87'		40.00'		
(34) PT	106+31.95				3012804.6099	680423.5410
		738.66'	S 11°03'10" W			
(35) PC	113+70.61				3012079.6492	680281.9290
		38.83'		50.00'		

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(36) PRC	114+09.44				3012048.0040	680261.1409
		15.63'		10.00'		
(37) PT	114+25.08				3012034.1619	680258.5101
		42.83'	S 34°01'38" W			
(38) PC	114+67.91				3011998.6656	680282.4773
		15.71'		10.00'		
(39) PT	114+83.61				3011984.7820	680279.7855
		9.32'	S 55°58'22" W			
(40) PC	114+92.94				3011979.5658	680272.0600
		39.12'		50.00'		



CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(41) PT	115+32.06				3011947.7905	680250.9821
		225.44'	S 11°08'36" W	225.44'		
(42) PC	117+57.50				3011726.6004	680207.4121
		24.51'		200.00'		
(43) PRC	117+82.01				3011702.9024	680201.2152
		24.51'		200.00'		
(44) PT	118+06.52				3011679.2043	680195.0184
		523.38'	S 11°08'36" W			

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(45) PC	123+29.89				3011165.6956	680093.8675
		32.62'		500.00'		
(46) PT	123+62.51				3011133.5108	680088.6116
		93.47'	S 07°24'21" W			
(47) PC	124+55.98				3011040.8198	680076.5636
		32.62'		500.00'		
(48) PT	124+88.60				3011008.6350	680071.3077
		451.39'	S 11°08'36" W			
(49) PC	129+39.99				3010565.7532	679984.0689

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

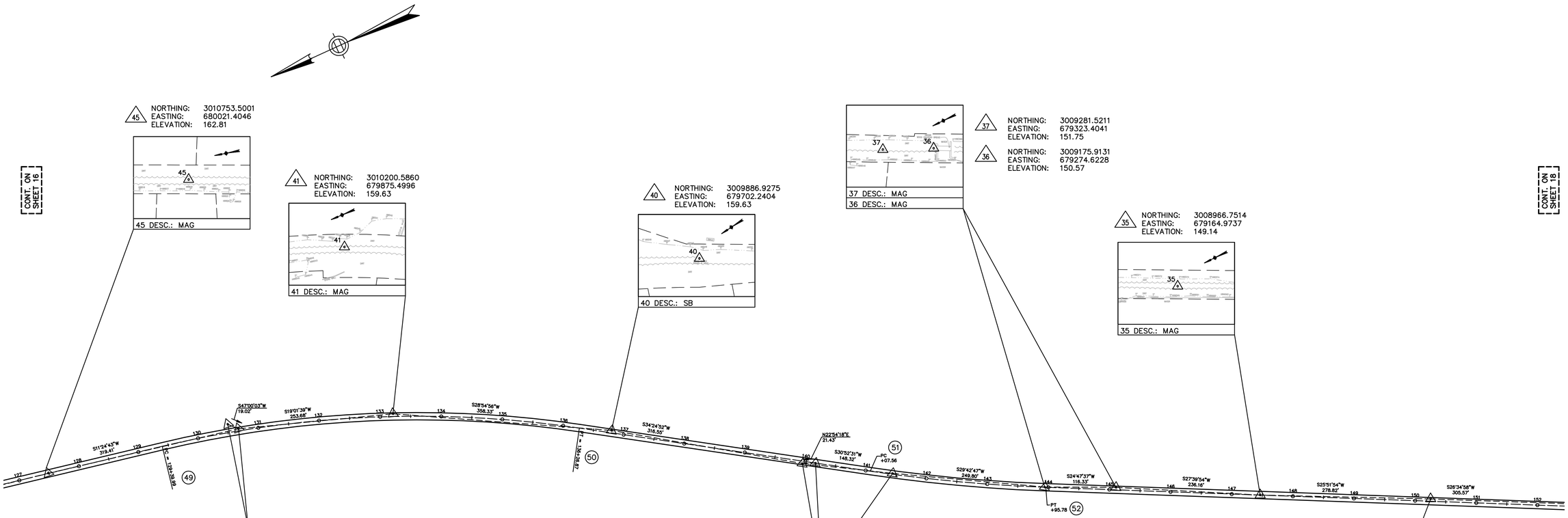
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	17	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN

CONT. ON SHEET 16

CONT. ON SHEET 18



45 NORTHING: 3010753.5001
EASTING: 680021.4046
ELEVATION: 162.81

41 NORTHING: 3010200.5860
EASTING: 679875.4996
ELEVATION: 159.63

40 NORTHING: 3009886.9275
EASTING: 679702.2404
ELEVATION: 159.63

37 NORTHING: 3009281.5211
EASTING: 679323.4041
ELEVATION: 151.75

36 NORTHING: 3009175.9131
EASTING: 679274.6228
ELEVATION: 150.57

35 NORTHING: 3008966.7514
EASTING: 679164.9737
ELEVATION: 149.14

44 NORTHING: 3010440.4044
EASTING: 679958.2054
ELEVATION: 161.11

107 NORTHING: 3010453.3743
EASTING: 679972.1121
ELEVATION: 162.02

39 NORTHING: 3009625.7827
EASTING: 679523.3347
ELEVATION: 154.81

38 NORTHING: 3009498.4773
EASTING: 679447.2188
ELEVATION: 153.90

109 NORTHING: 3009606.0426
EASTING: 679514.9941
ELEVATION: 154.08

34 NORTHING: 3008715.8621
EASTING: 679043.3383
ELEVATION: 148.13

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(49) PC	129+39.99				3010565.7532	679984.0689
		686.88'		1800.00'		
(50) PT	136+26.87				3009933.0866	679727.4856
		480.69'	S 33°00'27" W			
(51) PC	141+07.56				3009529.9772	679465.6292
		288.22'		2600.00'		
(52) PT	143+95.78'				3009280.0754	679322.3256
		1597.58'	S 26°39'21" W			
(53) PC	159+88.49				3007852.2942	678605.6024

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

GRAPHIC SCALE
0 40 80 120 160 240FEET

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	18	137
PROJECT FILE NO. 604532				

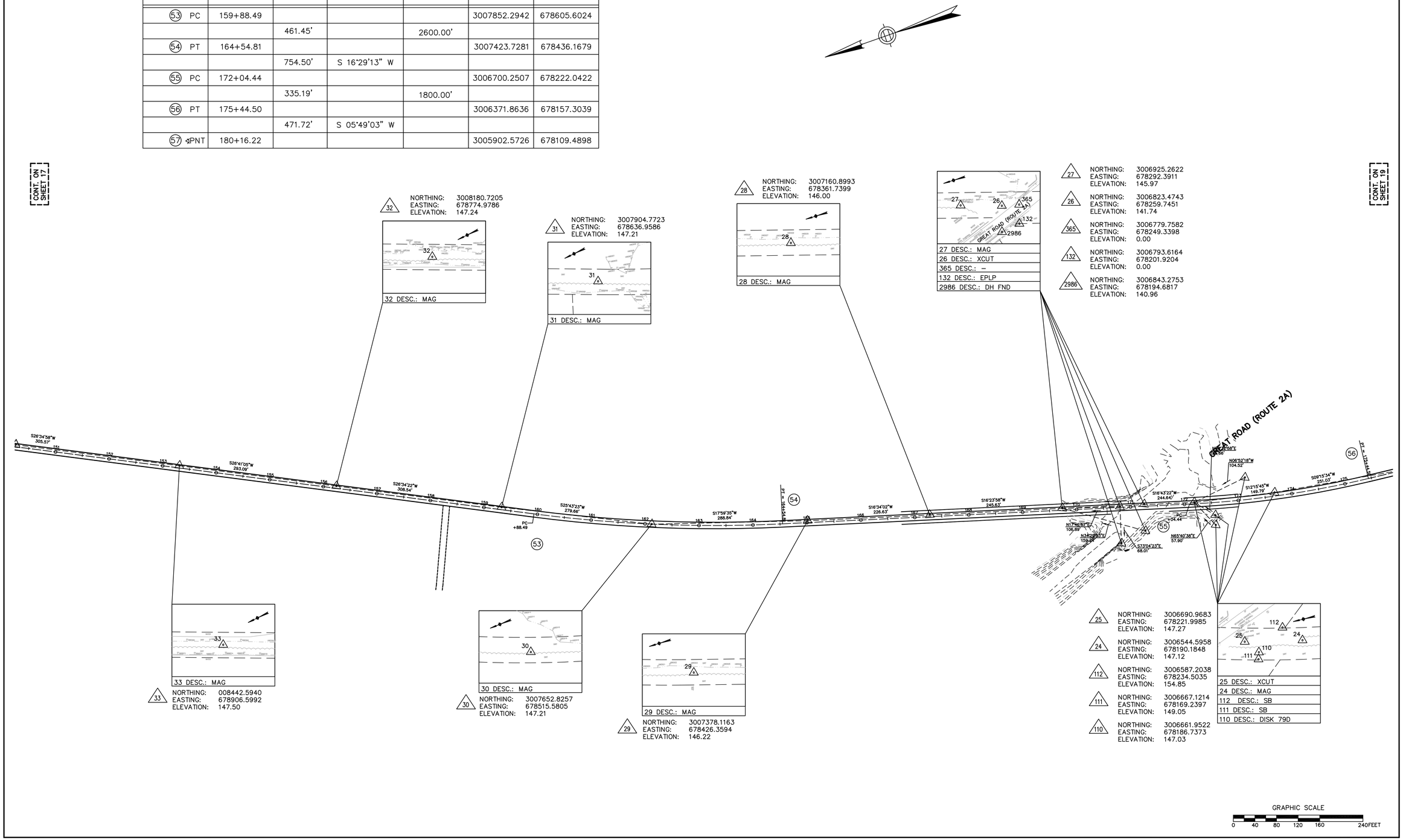
SURVEY CONTROL PLAN

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(53) PC	159+88.49				3007852.2942	678605.6024
		461.45'		2600.00'		
(54) PT	164+54.81				3007423.7281	678436.1679
		754.50'	S 16°29'13" W			
(55) PC	172+04.44				3006700.2507	678222.0422
		335.19'		1800.00'		
(56) PT	175+44.50				3006371.8636	678157.3039
		471.72'	S 05°49'03" W			
(57) ◁PNT	180+16.22				3005902.5726	678109.4898

CONT. ON SHEET 17

CONT. ON SHEET 19



32 — NORTHING: 3008180.7205, EASTING: 678774.9786, ELEVATION: 147.24
32 DESC.: MAG

31 — NORTHING: 3007904.7723, EASTING: 678636.9586, ELEVATION: 147.21
31 DESC.: MAG

28 — NORTHING: 3007160.8993, EASTING: 678361.7399, ELEVATION: 146.00
28 DESC.: MAG

27 — NORTHING: 3006925.2622, EASTING: 678292.3911, ELEVATION: 145.97
26 — NORTHING: 3006823.4743, EASTING: 678259.7451, ELEVATION: 141.74
365 — NORTHING: 3006779.7582, EASTING: 678249.3398, ELEVATION: 0.00
132 — NORTHING: 3006793.6164, EASTING: 678201.9204, ELEVATION: 0.00
2986 — NORTHING: 3006843.2753, EASTING: 678194.6817, ELEVATION: 140.96
27 DESC.: MAG
26 DESC.: XCUT
365 DESC.: –
132 DESC.: EPLP
2986 DESC.: DH FND

33 — NORTHING: 008442.5940, EASTING: 678906.5992, ELEVATION: 147.50
33 DESC.: MAG

30 — NORTHING: 3007652.8257, EASTING: 678515.5805, ELEVATION: 147.21
30 DESC.: MAG

29 — NORTHING: 3007378.1163, EASTING: 678426.3594, ELEVATION: 146.22
29 DESC.: MAG

25 — NORTHING: 3006690.9683, EASTING: 678221.9985, ELEVATION: 147.27
24 — NORTHING: 3006544.5958, EASTING: 678190.1848, ELEVATION: 147.12
112 — NORTHING: 3006587.2038, EASTING: 678234.5035, ELEVATION: 154.85
111 — NORTHING: 3006667.1214, EASTING: 678169.2397, ELEVATION: 149.05
110 — NORTHING: 3006661.9522, EASTING: 678186.7373, ELEVATION: 147.03
25 DESC.: XCUT
24 DESC.: MAG
112 DESC.: SB
111 DESC.: SB
110 DESC.: DISK 79D

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	19	137
PROJECT FILE NO. 604532				

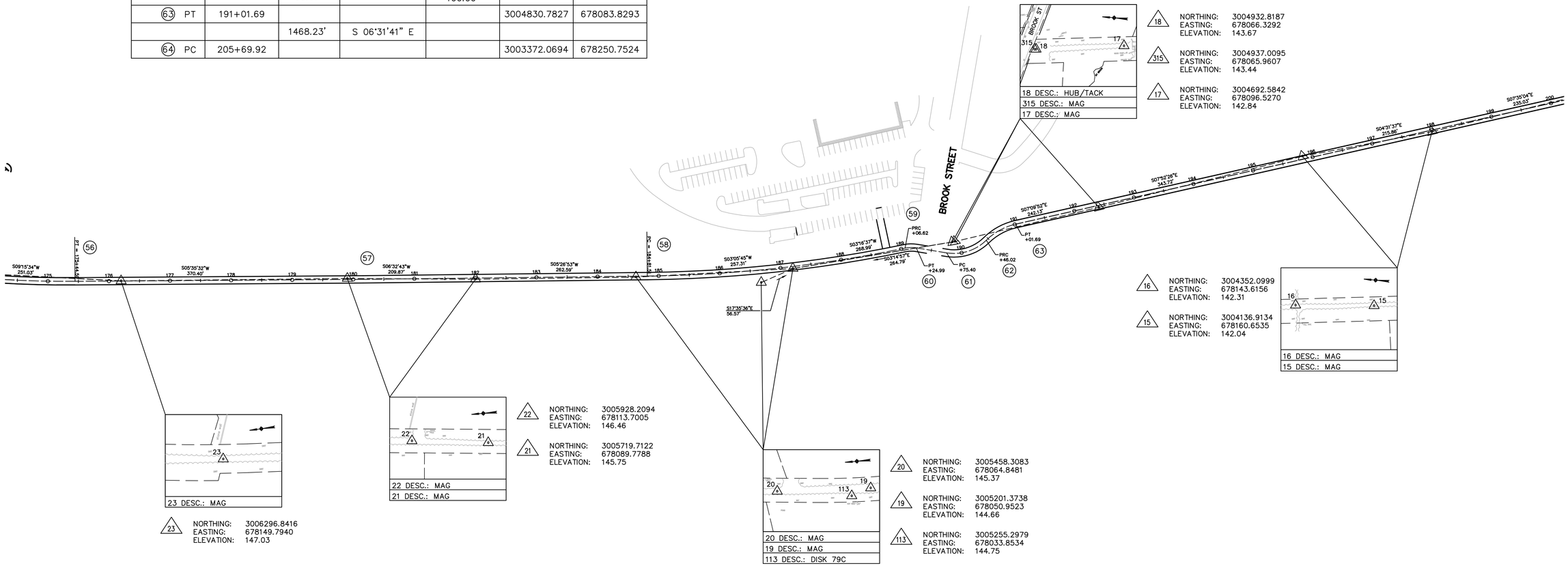
SURVEY CONTROL PLAN

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(56) PT	175+44.50				3006371.8636	678157.3039
		471.72'	S 05°49'03" W			
(57) ⊲PNT	180+16.22				3005902.5726	678109.4898
		465.29'	S 05°32'57" W			
(58) PC	184+81.51				3005439.4651	678064.4977
		425.12'		2200.00'		
(59) PRC	189+06.62				3005015.0092	678064.3995
		18.37'		50.00'		
(60) PT	189+24.99				3004996.8130	678062.8068
		50.40'	S 15°31'36" W			
(61) PC	189+75.40				3004948.2497	678049.3147
		70.62'		75.00'		
(62) PRC	190+46.02				3004881.5620	678062.8205
		55.67		100.00'		
(63) PT	191+01.69				3004830.7827	678083.8293
		1468.23'	S 06°31'41" E			
(64) PC	205+69.92				3003372.0694	678250.7524

CONT. ON SHEET 18

CONT. ON SHEET 20



18 NORTHING: 3004932.8187
EASTING: 678066.3292
ELEVATION: 143.67

315 NORTHING: 3004937.0095
EASTING: 678065.9607
ELEVATION: 143.44

17 NORTHING: 3004692.5842
EASTING: 678096.5270
ELEVATION: 142.84

16 NORTHING: 3004352.0999
EASTING: 678143.6156
ELEVATION: 142.31

15 NORTHING: 3004136.9134
EASTING: 678160.6535
ELEVATION: 142.04

22 NORTHING: 3005928.2094
EASTING: 678113.7005
ELEVATION: 146.46

21 NORTHING: 3005719.7122
EASTING: 678089.7788
ELEVATION: 145.75

23 NORTHING: 3006296.8416
EASTING: 678149.7940
ELEVATION: 147.03

20 NORTHING: 3005458.3083
EASTING: 678064.8481
ELEVATION: 145.37

19 NORTHING: 3005201.3738
EASTING: 678050.9523
ELEVATION: 144.66

113 NORTHING: 3005255.2979
EASTING: 678033.8534
ELEVATION: 144.75

GRAPHIC SCALE
0 40 80 120 160 240FEET

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

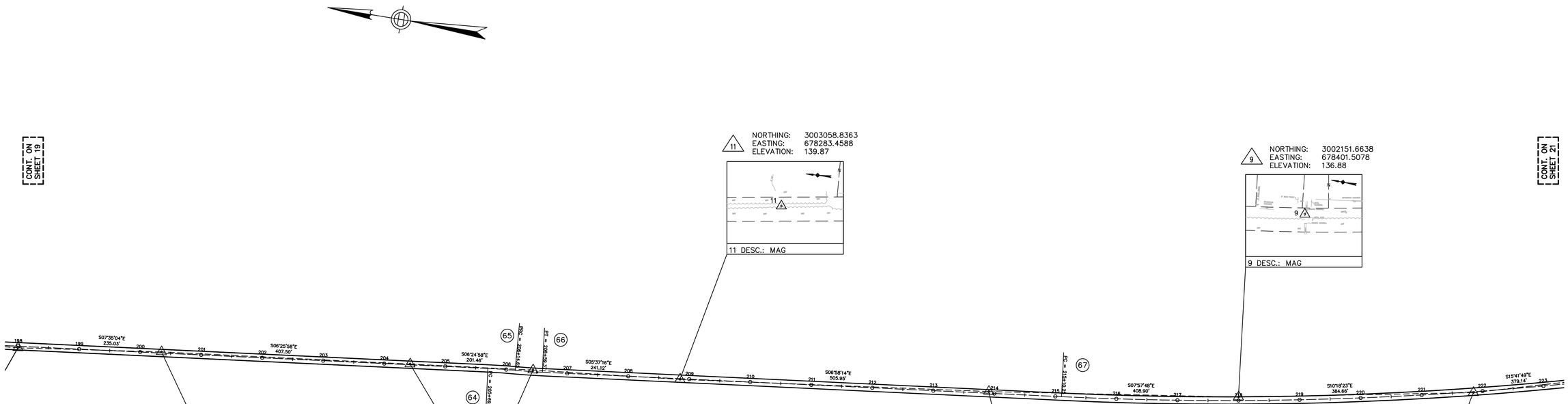
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	20	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN

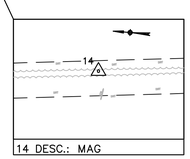
CONT. ON SHEET 19

CONT. ON SHEET 21

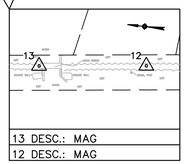


11 NORTHING: 3003058.8363
EASTING: 678283.4588
ELEVATION: 139.87

9 NORTHING: 3002151.6638
EASTING: 678401.5078
ELEVATION: 136.88

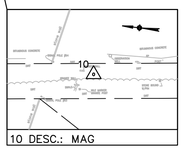


14 NORTHING: 3003903.9346
EASTING: 678191.6746
ELEVATION: 141.76

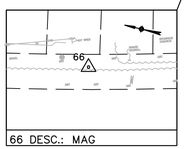


13 NORTHING: 3003498.9951
EASTING: 678237.3294
ELEVATION: 141.29

12 NORTHING: 3003298.7919
EASTING: 678259.8423
ELEVATION: 140.63



10 NORTHING: 3002556.6258
EASTING: 678344.8594
ELEVATION: 138.00



66 NORTHING: 3001773.2104
EASTING: 678470.3289
ELEVATION: 137.39

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(64) PC	205+69.92				3003372.0694	678250.7524
		44.73'		10000.00'		
(65) PRC	206+14.65				3003327.5354	678254.8420
		44.73'		1000.00'		
(66) PT	206+59.37				3003283.0014	678258.9316
		850.88'	S 06°31'41" E			
(67) PC	215+10.25				3002437.6391	678355.6679
		1097.51'		5700.00'		
(68) PT	226+07.75				3001365.9502	678584.3239

GRAPHIC SCALE

0 40 80 120 160 240FEET

IN CHARGE OF	GJH
DESIGNED BY	DZM
CHECKED BY	GJH
DRAWN BY	DZM
CHECKED BY	GJH

WESTFORD, CARLISLE & ACTON

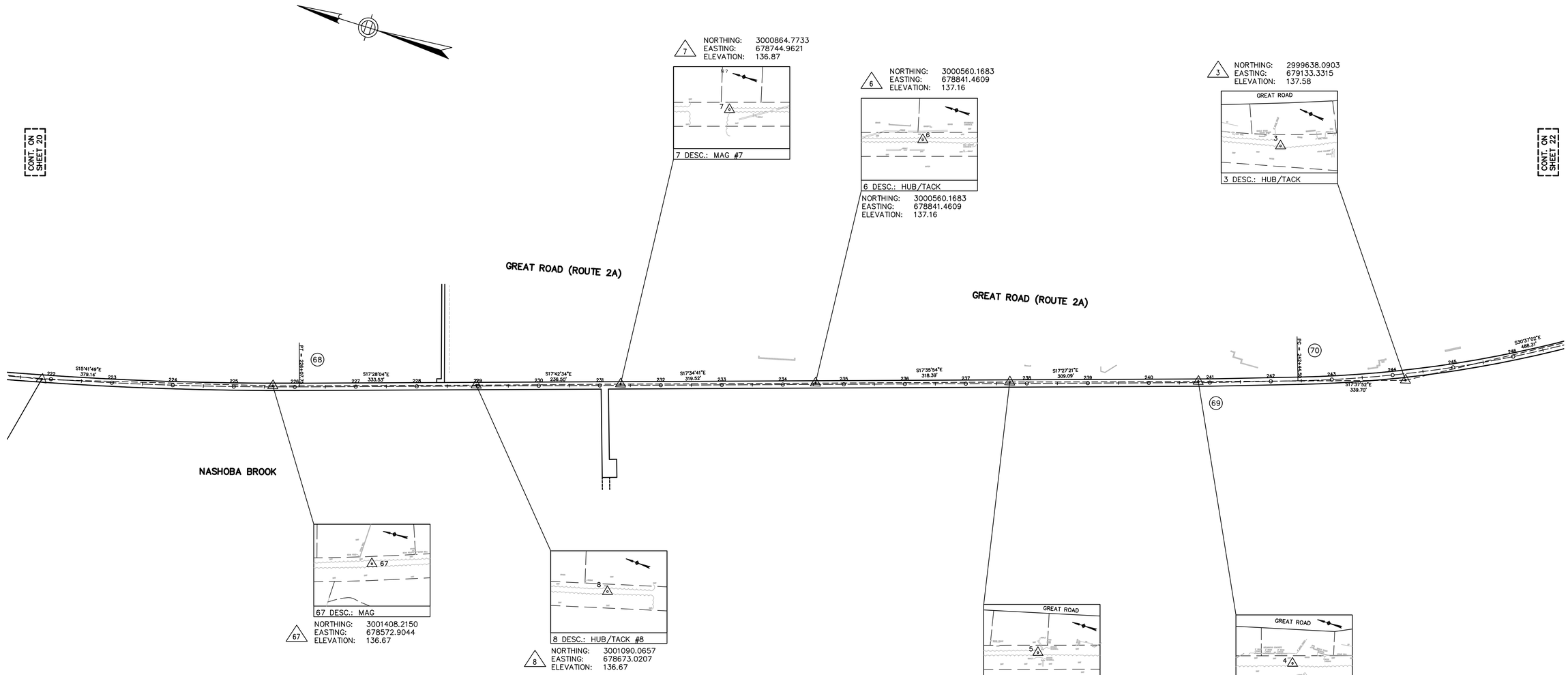
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	21	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN

CONT. ON SHEET 20

CONT. ON SHEET 22



CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(68) PT	226+07.75				3001365.9502	678584.3239
		1493.59'	S 17°33'36" E			
(69) ⊲PNT	241+01.34				2999941.9596	679034.9481
		143.16'	S 18°21'21" E			
(70) PC	242+44.50				2999806.1654	679080.2682
		492.89'		1950.00'		
(71) PRC	247+37.39				2999363.2036	679293.4241

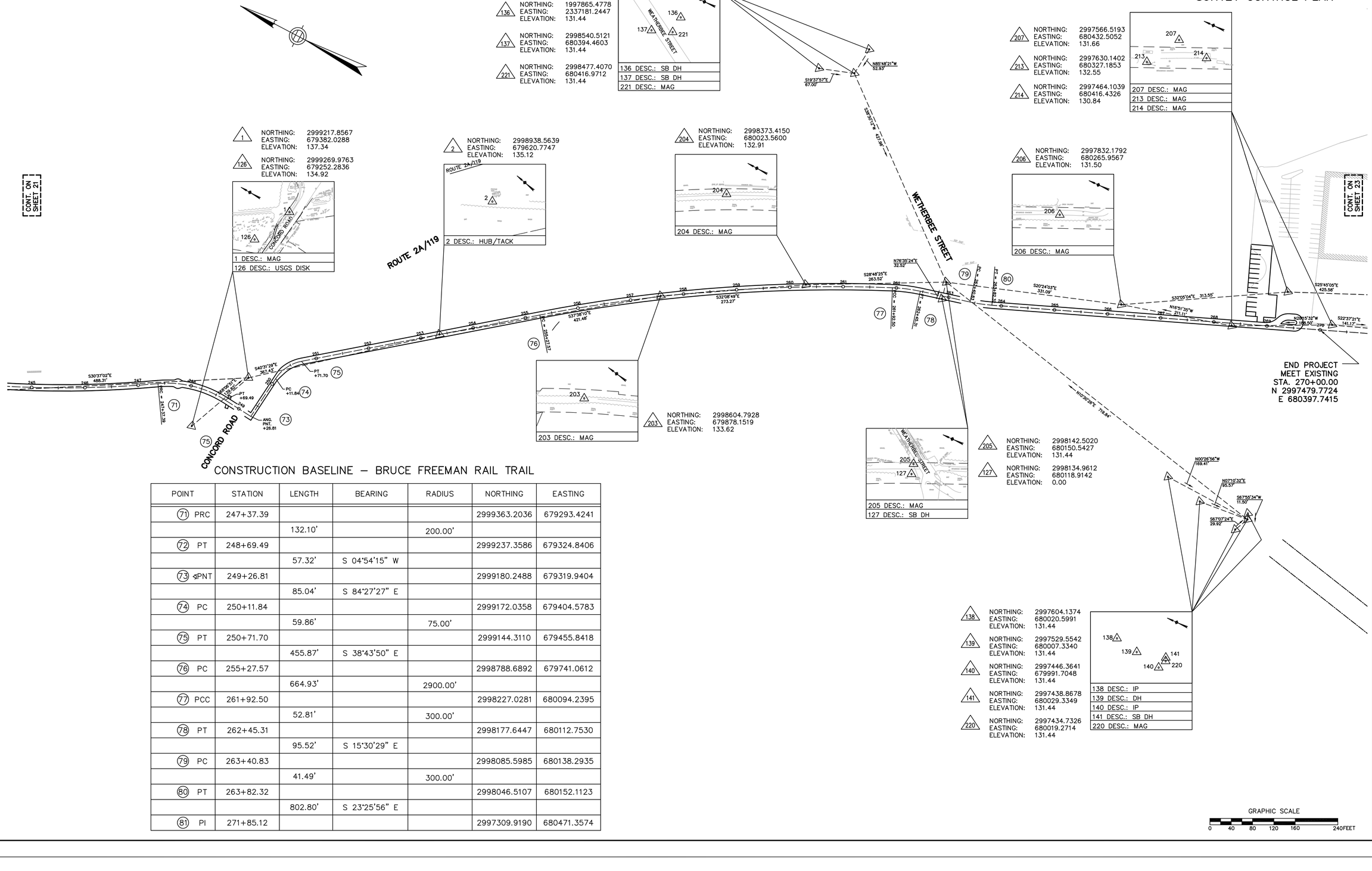
IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

GRAPHIC SCALE
0 40 80 120 160 240FEET

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	22	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN



CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(71) PRC	247+37.39				2999363.2036	679293.4241
		132.10'		200.00'		
(72) PT	248+69.49				2999237.3586	679324.8406
		57.32'	S 04°54'15" W			
(73) ⊲PNT	249+26.81				2999180.2488	679319.9404
		85.04'	S 84°27'27" E			
(74) PC	250+11.84				2999172.0358	679404.5783
		59.86'		75.00'		
(75) PT	250+71.70				2999144.3110	679455.8418
		455.87'	S 38°43'50" E			
(76) PC	255+27.57				2998788.6892	679741.0612
		664.93'		2900.00'		
(77) PCC	261+92.50				2998227.0281	680094.2395
		52.81'		300.00'		
(78) PT	262+45.31				2998177.6447	680112.7530
		95.52'	S 15°30'29" E			
(79) PC	263+40.83				2998085.5985	680138.2935
		41.49'		300.00'		
(80) PT	263+82.32				2998046.5107	680152.1123
		802.80'	S 23°25'56" E			
(81) PI	271+85.12				2997309.9190	680471.3574

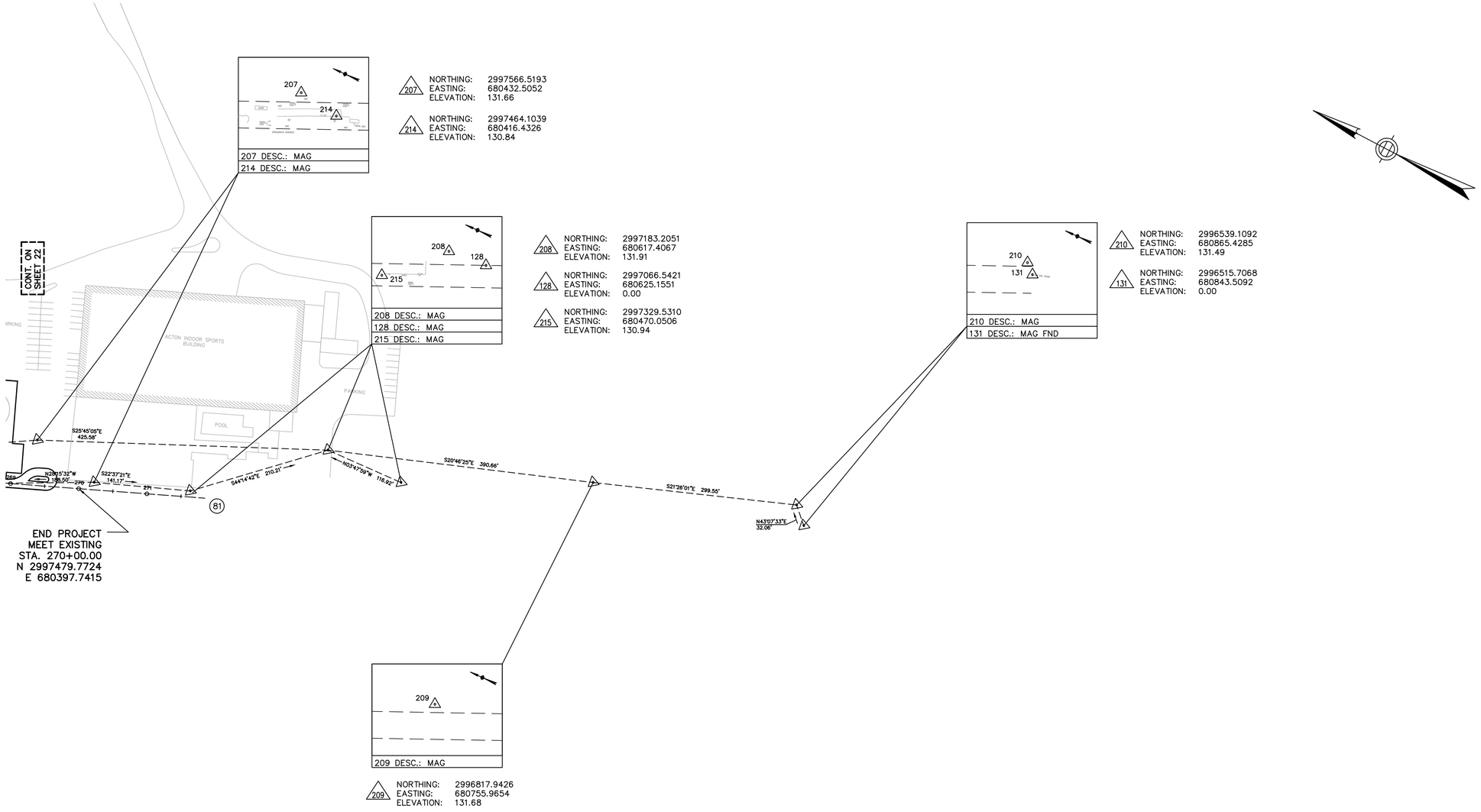
IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	23	137
PROJECT FILE NO. 604532				

SURVEY CONTROL PLAN



207	NORTHING:	2997566.5193
	EASTING:	680432.5052
	ELEVATION:	131.66
214	NORTHING:	2997464.1039
	EASTING:	680416.4326
	ELEVATION:	130.84
208	NORTHING:	2997183.2051
	EASTING:	680617.4067
	ELEVATION:	131.91
128	NORTHING:	2997066.5421
	EASTING:	680625.1551
	ELEVATION:	0.00
215	NORTHING:	2997329.5310
	EASTING:	680470.0506
	ELEVATION:	130.94
210	NORTHING:	2996539.1092
	EASTING:	680865.4285
	ELEVATION:	131.49
131	NORTHING:	2996515.7068
	EASTING:	680843.5092
	ELEVATION:	0.00
209	NORTHING:	2996817.9426
	EASTING:	680755.9654
	ELEVATION:	131.68

CONSTRUCTION BASELINE – BRUCE FREEMAN RAIL TRAIL

POINT	STATION	LENGTH	BEARING	RADIUS	NORTHING	EASTING
(81) PI	271+85.12				2997309.9190	680471.3574

IN CHARGE OF GJH
DESIGNED BY DZM
CHECKED BY GJH
DRAWN BY DZM
CHECKED BY GJH

GRAPHIC SCALE
0 40 80 120 160 240FEET

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
SEE BELOW

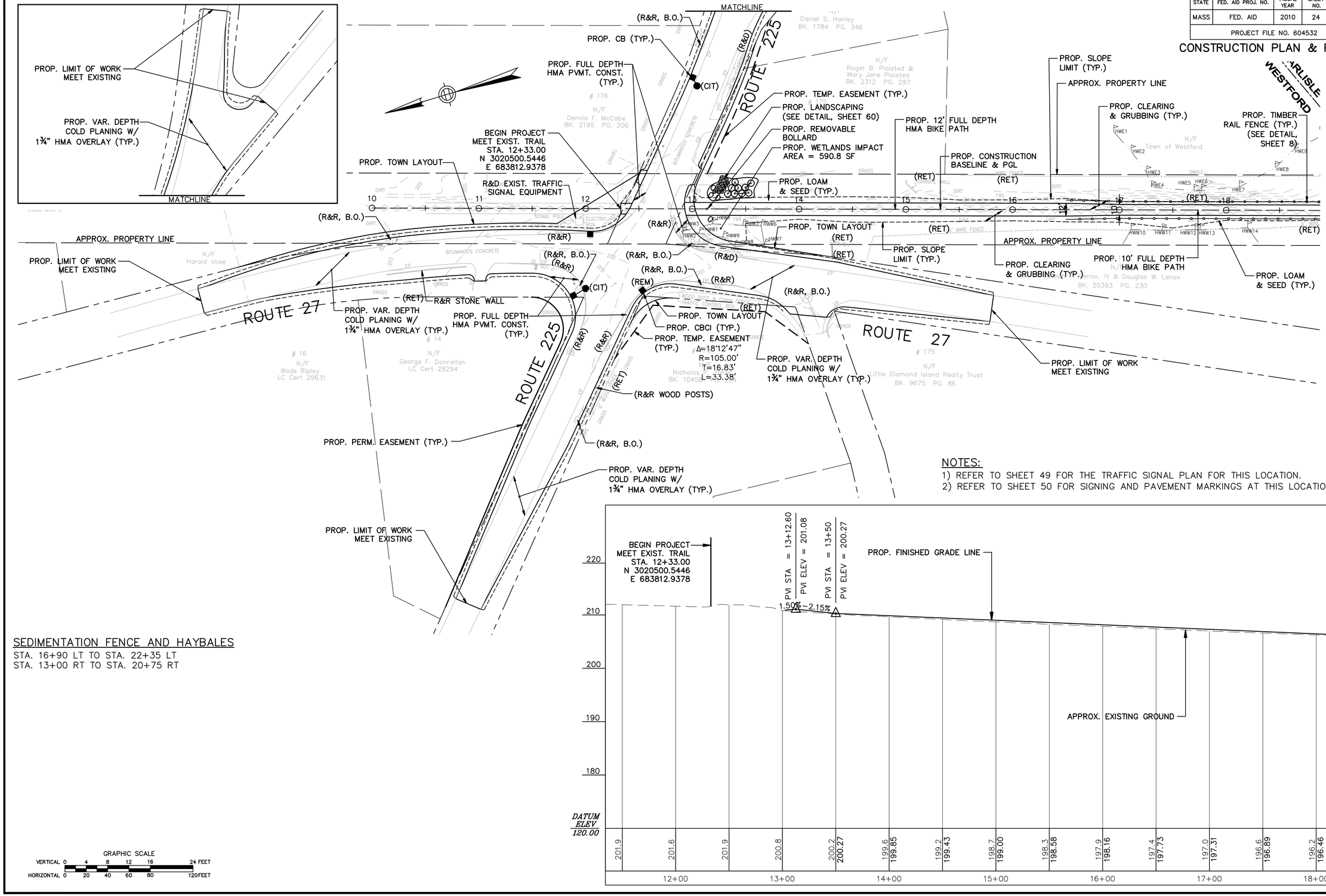
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
SEE SHEET 49

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	24	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



NOTES:
1) REFER TO SHEET 49 FOR THE TRAFFIC SIGNAL PLAN FOR THIS LOCATION.
2) REFER TO SHEET 50 FOR SIGNING AND PAVEMENT MARKINGS AT THIS LOCATION.

SEDIMENTATION FENCE AND HAYBALES
STA. 16+90 LT TO STA. 22+35 LT
STA. 13+00 RT TO STA. 20+75 RT

GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120FEET

IN CHARGE OF	GJH
DESIGNED BY	CRB
CHECKED BY	GJH
DRAWN BY	CRB
CHECKED BY	GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

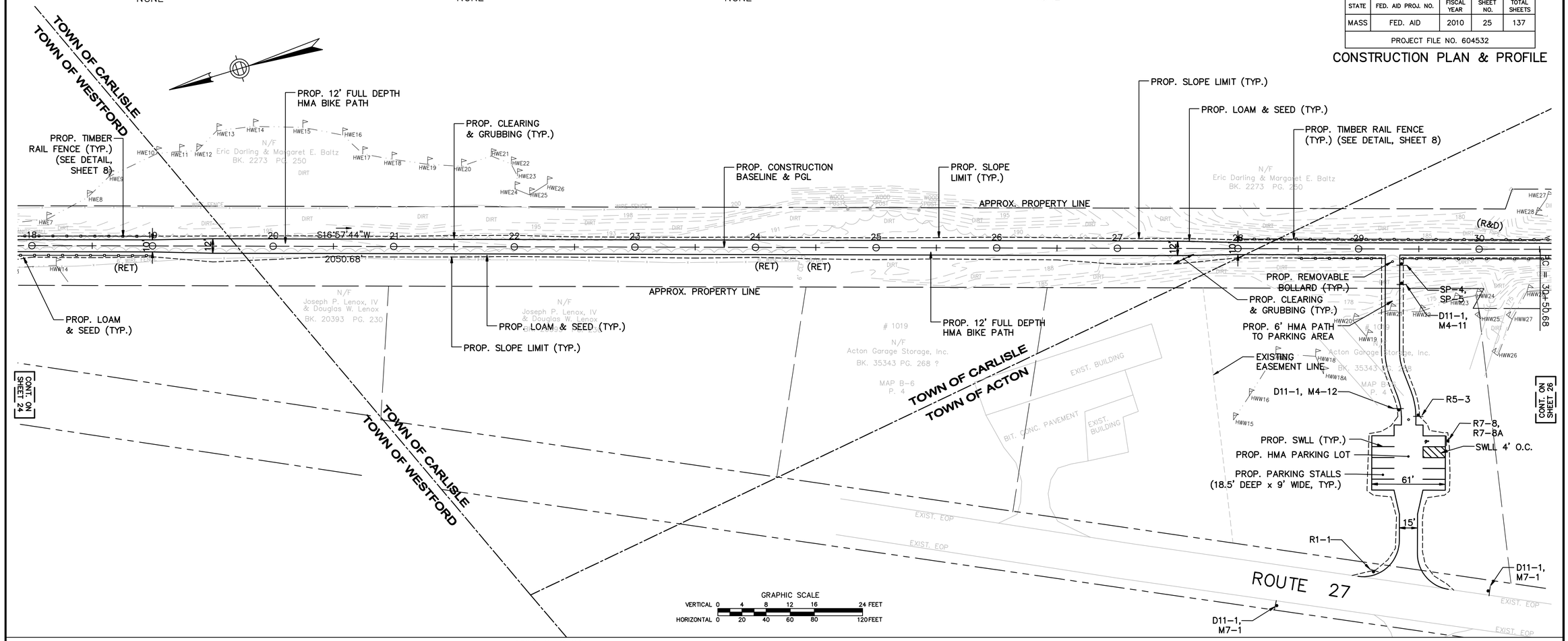
WATER SUPPLY ALTERATIONS
NONE

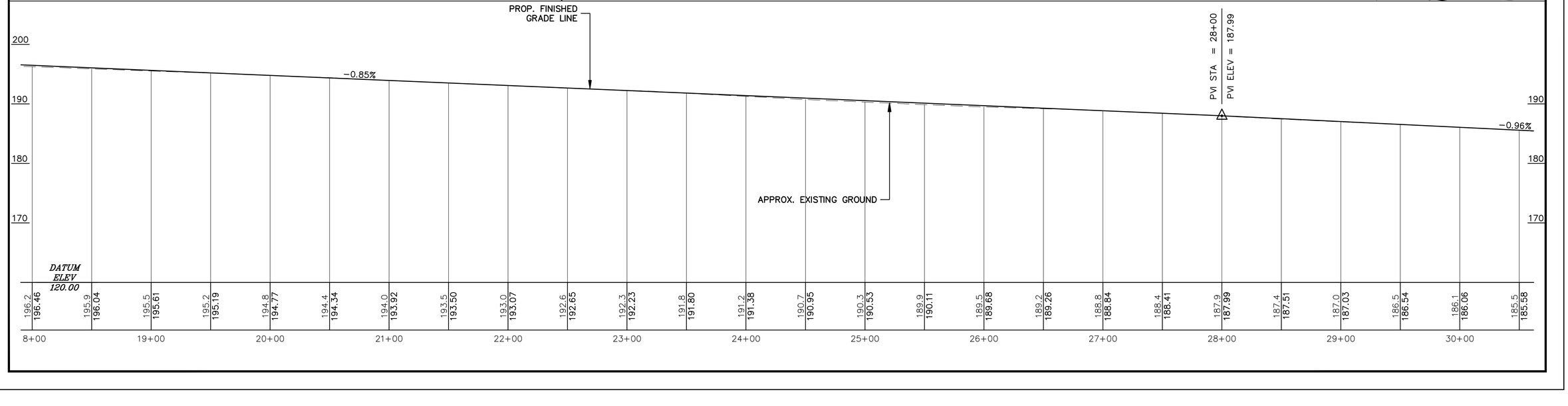
TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	25	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE





IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

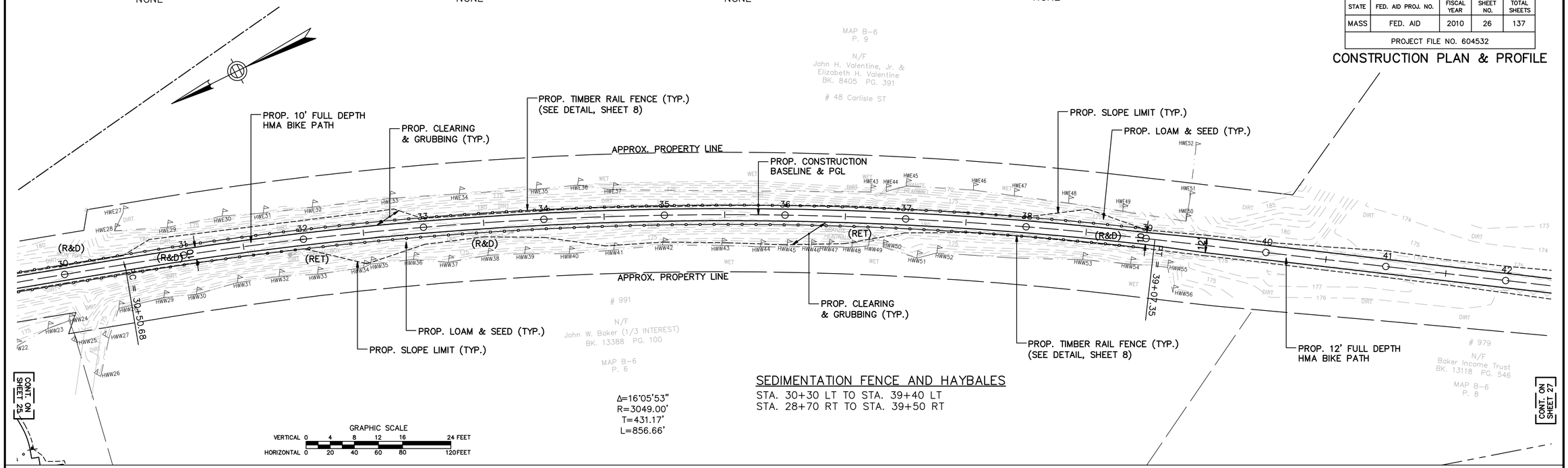
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	26	137
PROJECT FILE NO. 604532				

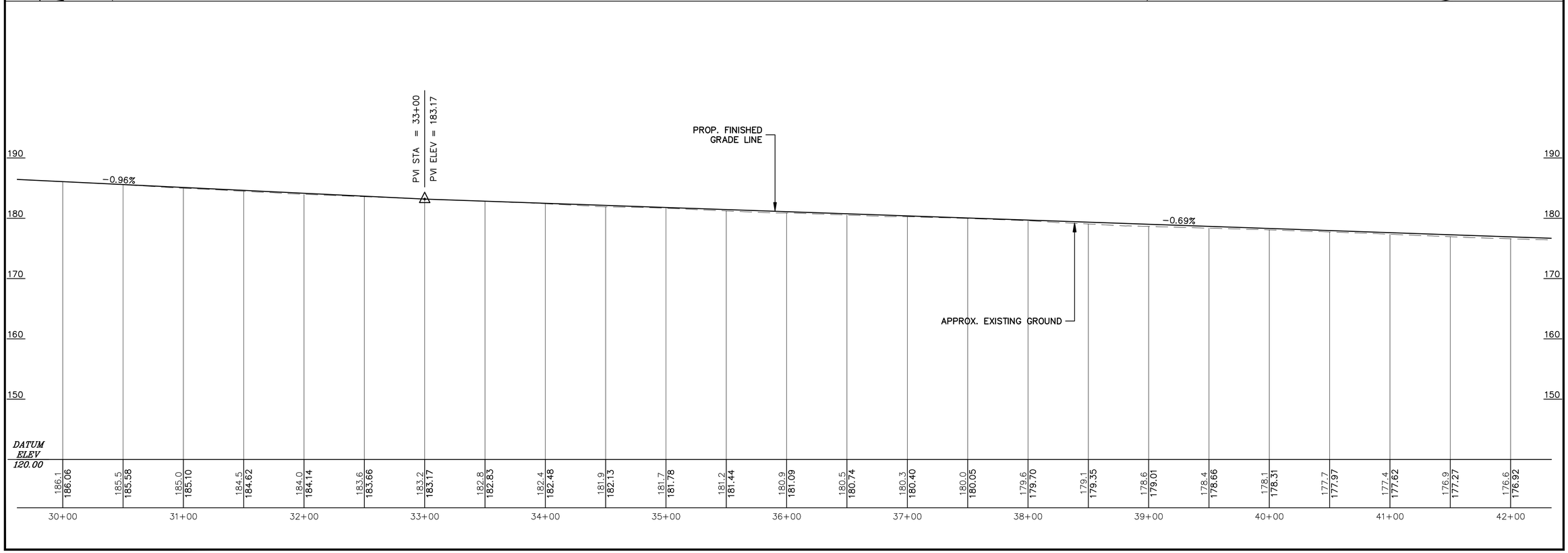
CONSTRUCTION PLAN & PROFILE



GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120FEET

Δ=16°05'53"
R=3049.00'
T=431.17'
L=856.66'

SEDIMENTATION FENCE AND HAYBALES
STA. 30+30 LT TO STA. 39+40 LT
STA. 28+70 RT TO STA. 39+50 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

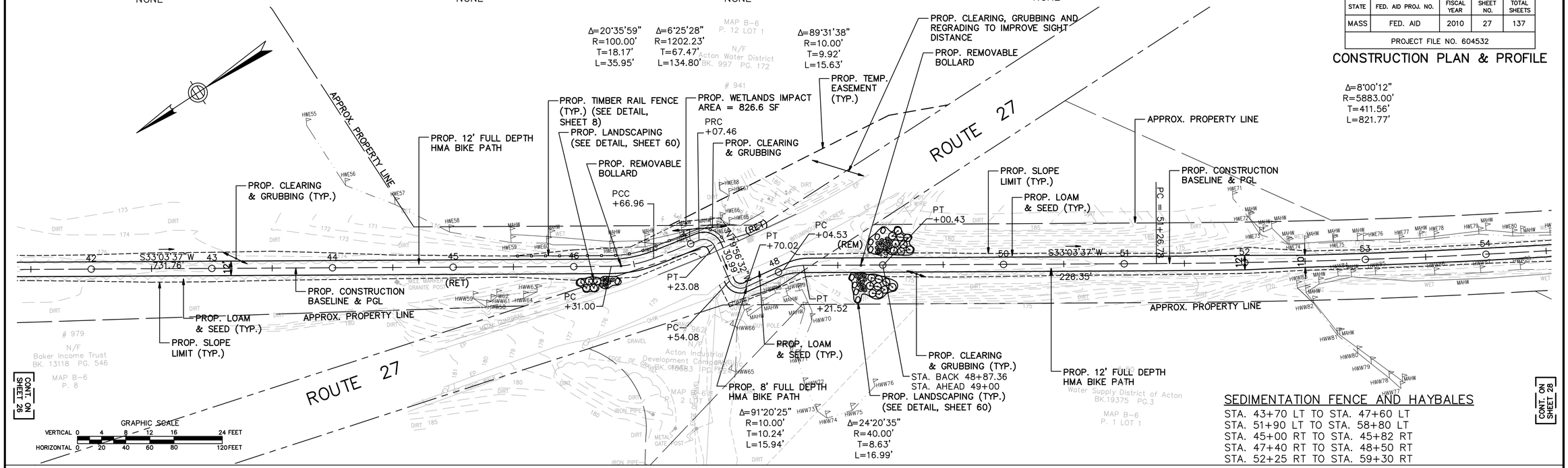
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

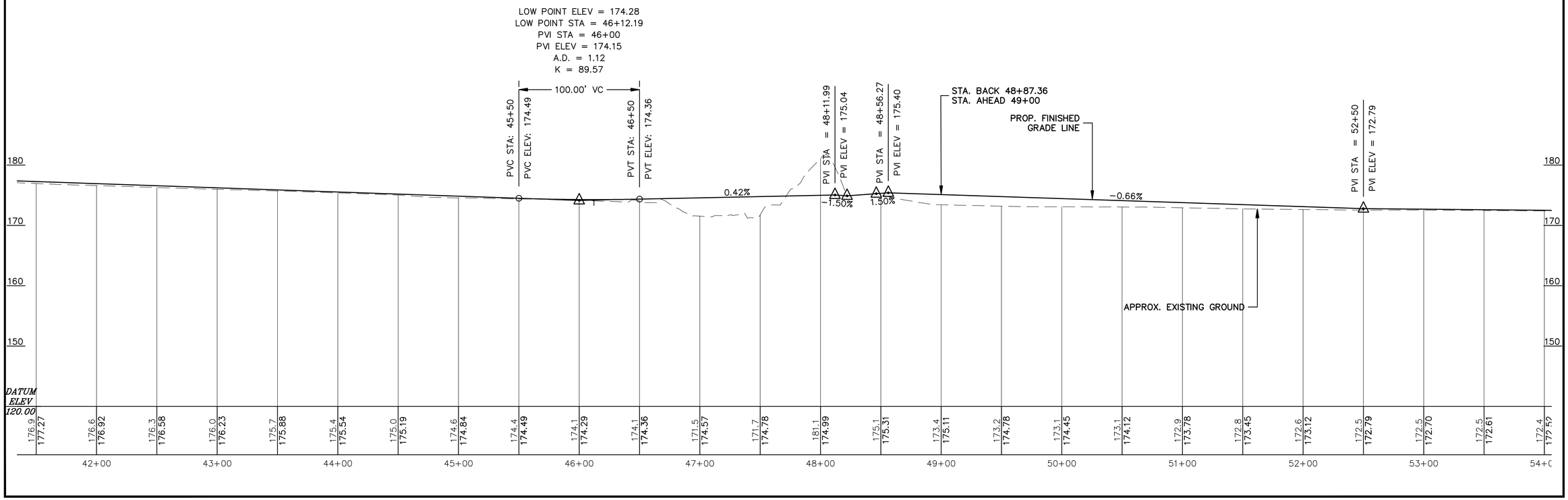
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	27	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 43+70 LT TO STA. 47+60 LT
STA. 51+90 LT TO STA. 58+80 LT
STA. 45+00 RT TO STA. 45+82 RT
STA. 47+40 RT TO STA. 48+50 RT
STA. 52+25 RT TO STA. 59+30 RT

NOTE:
1) REFER TO SHEET 51 FOR THE TRAFFIC PLAN FOR THIS LOCATION.



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

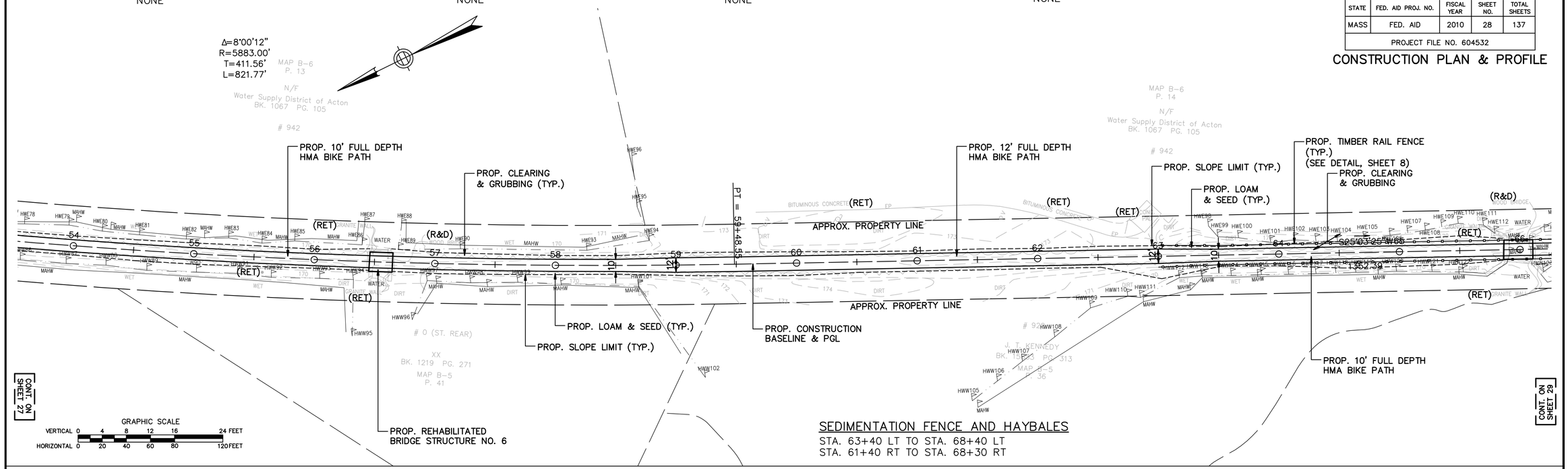
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

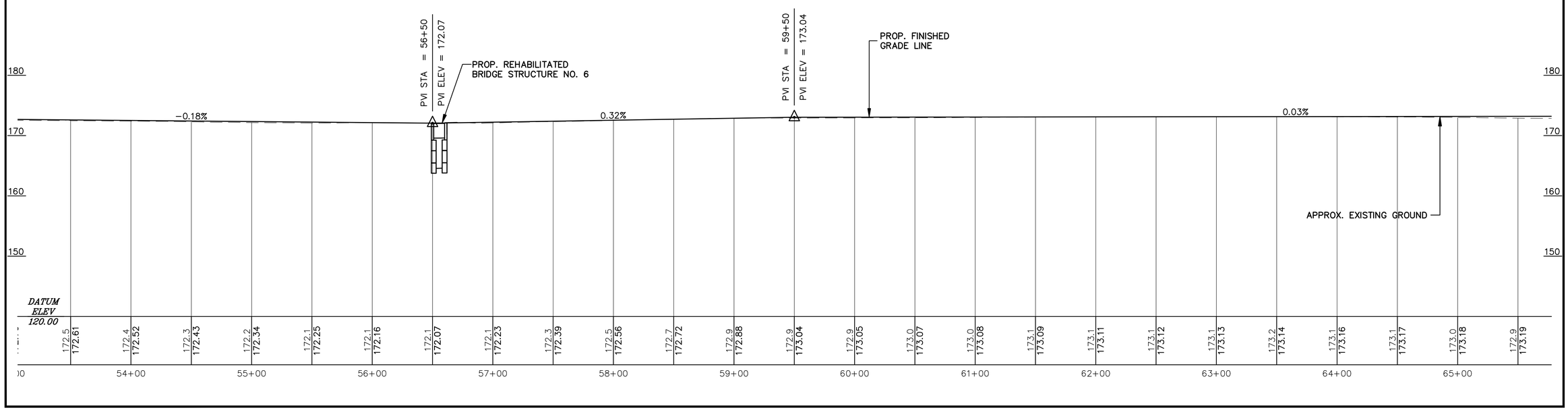
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	28	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 63+40 LT TO STA. 68+40 LT
STA. 61+40 RT TO STA. 68+30 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

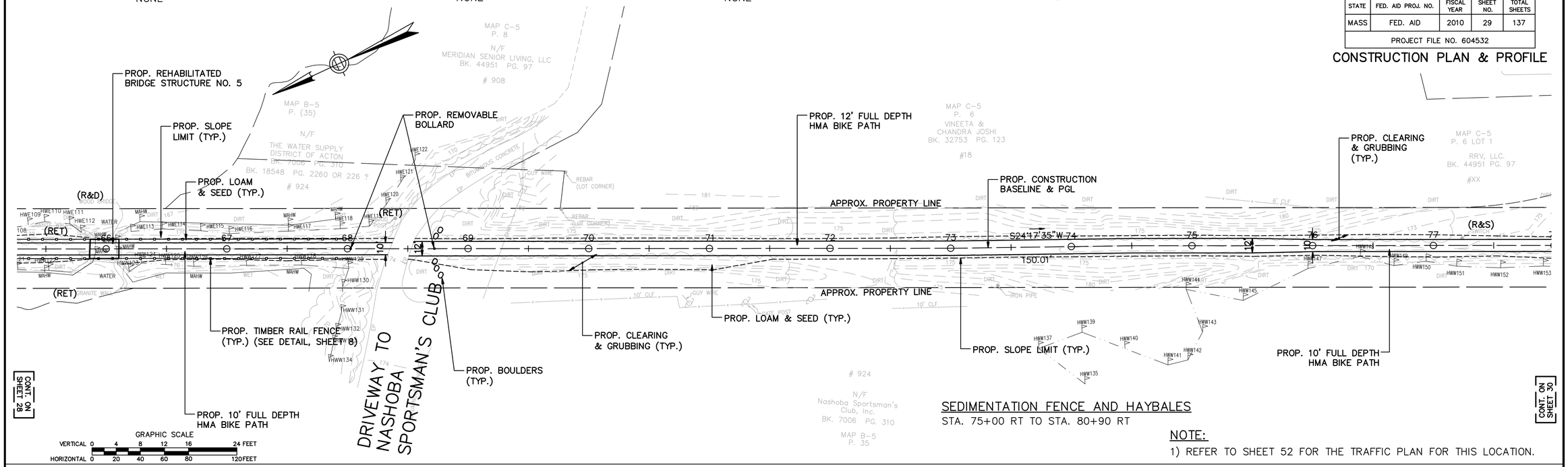
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

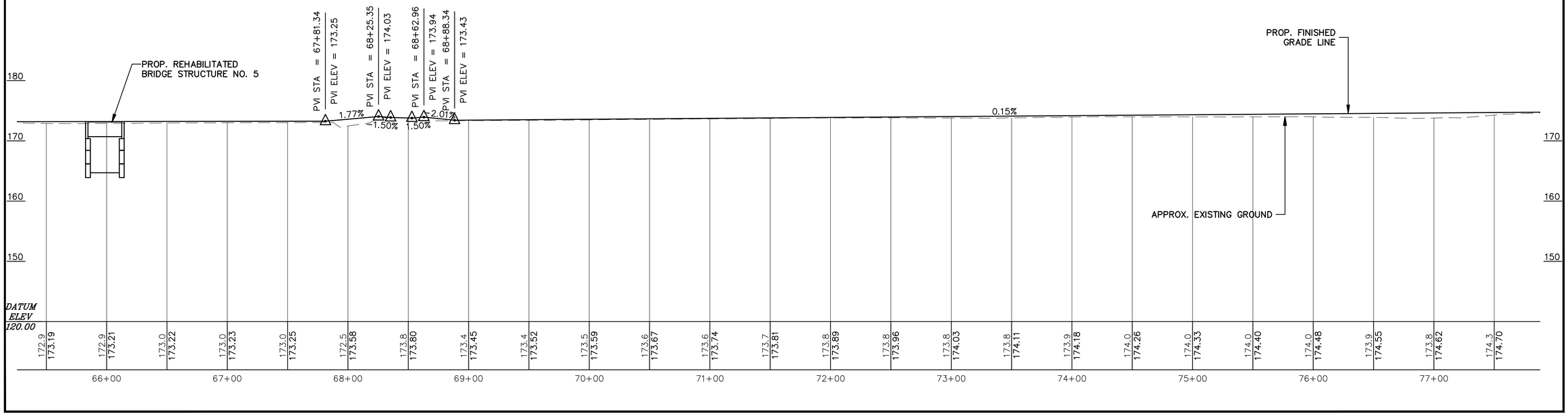
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	29	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 75+00 RT TO STA. 80+90 RT

NOTE:
1) REFER TO SHEET 52 FOR THE TRAFFIC PLAN FOR THIS LOCATION.



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

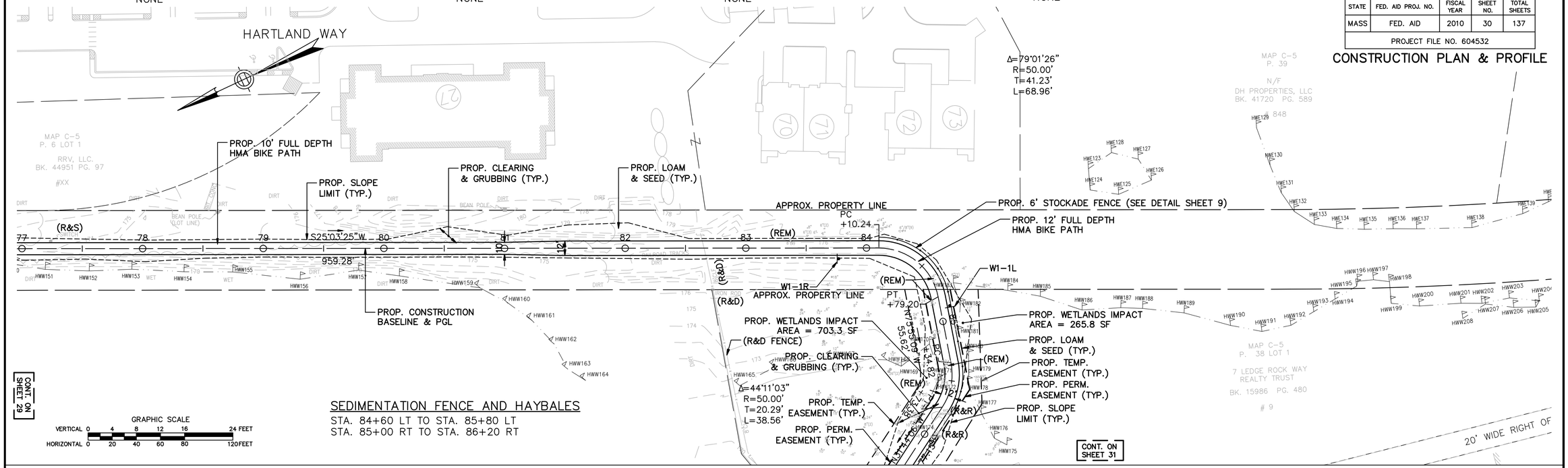
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

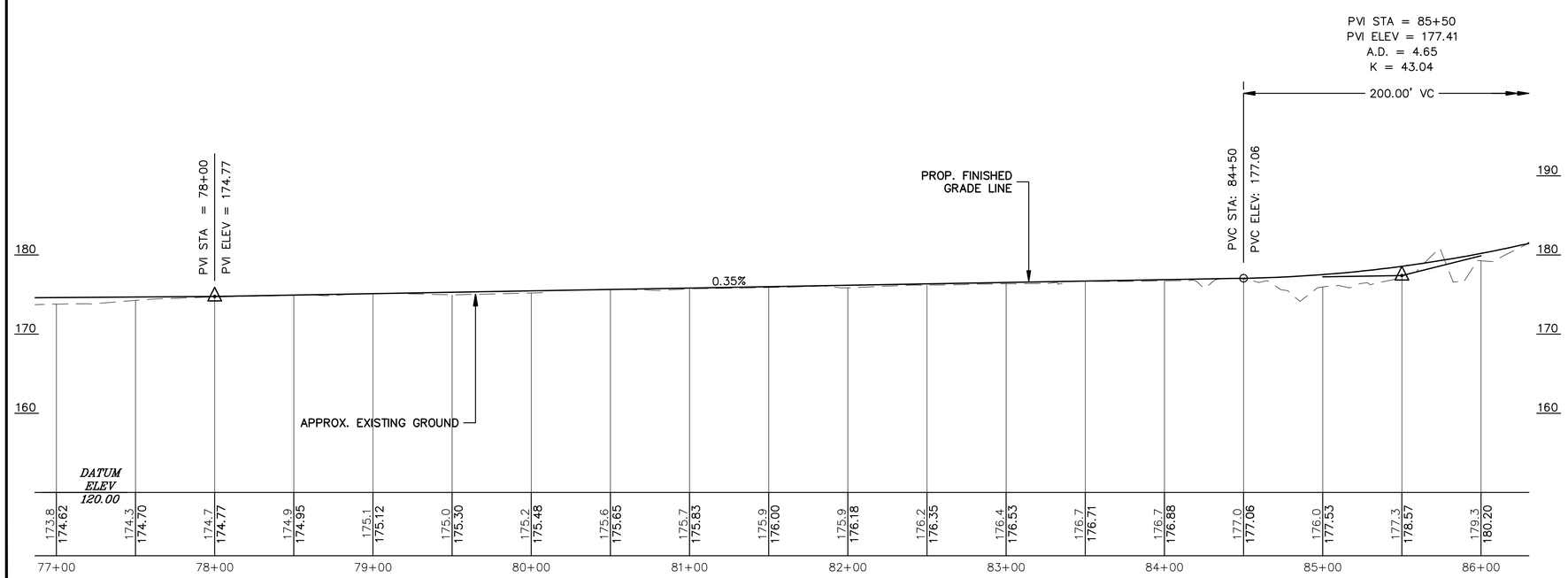
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	30	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 84+60 LT TO STA. 85+80 LT
STA. 85+00 RT TO STA. 86+20 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

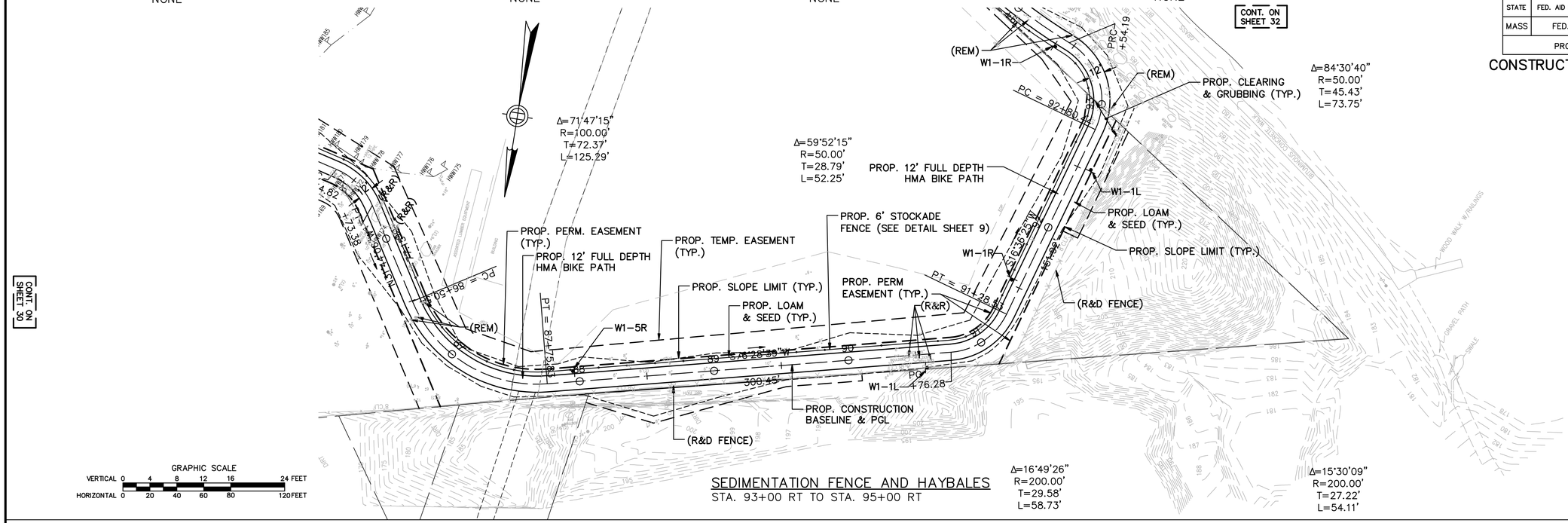
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

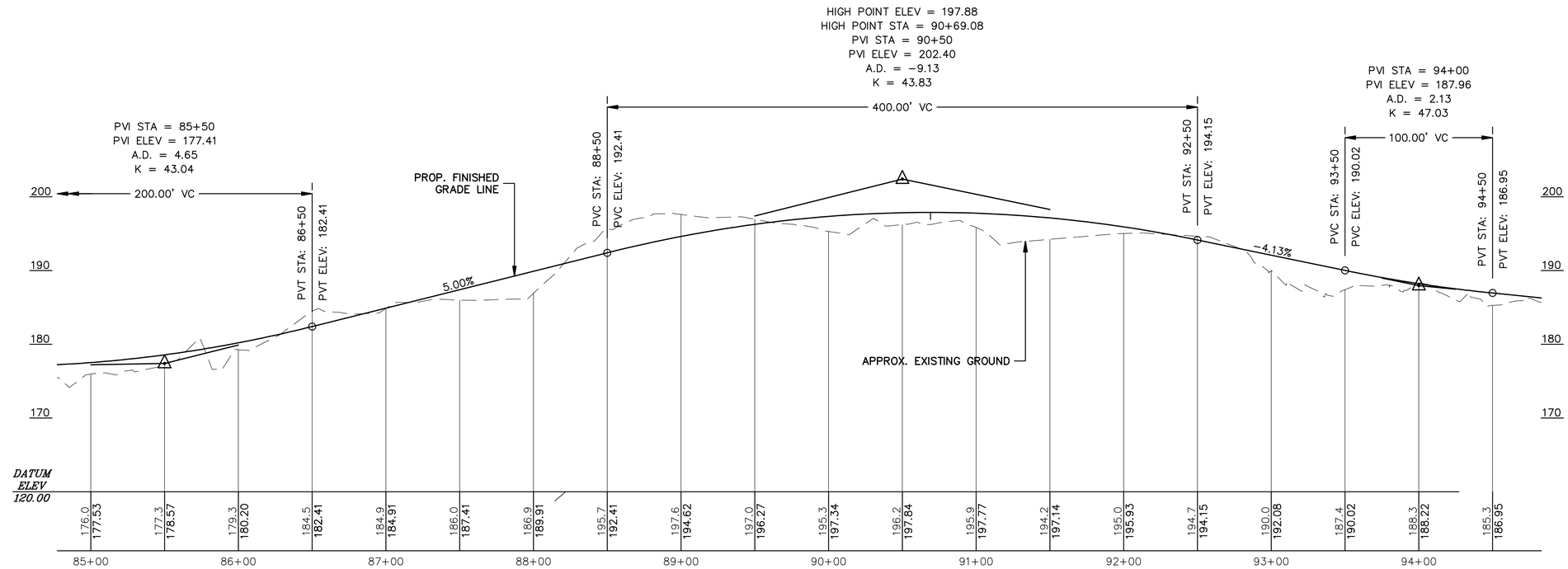
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	31	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120 FEET

SEDIMENTATION FENCE AND HAYBALES
STA. 93+00 RT TO STA. 95+00 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

WATER SUPPLY ALTERATIONS
NONE

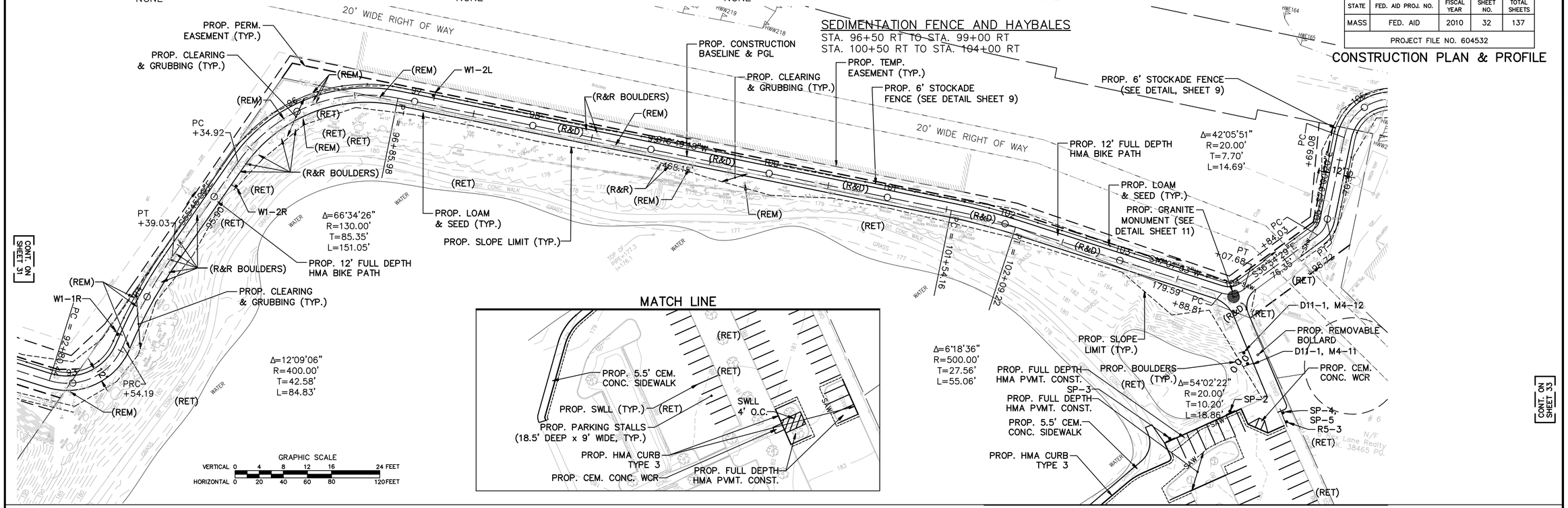
TRAFFIC SIGNAL CONDUIT
NONE

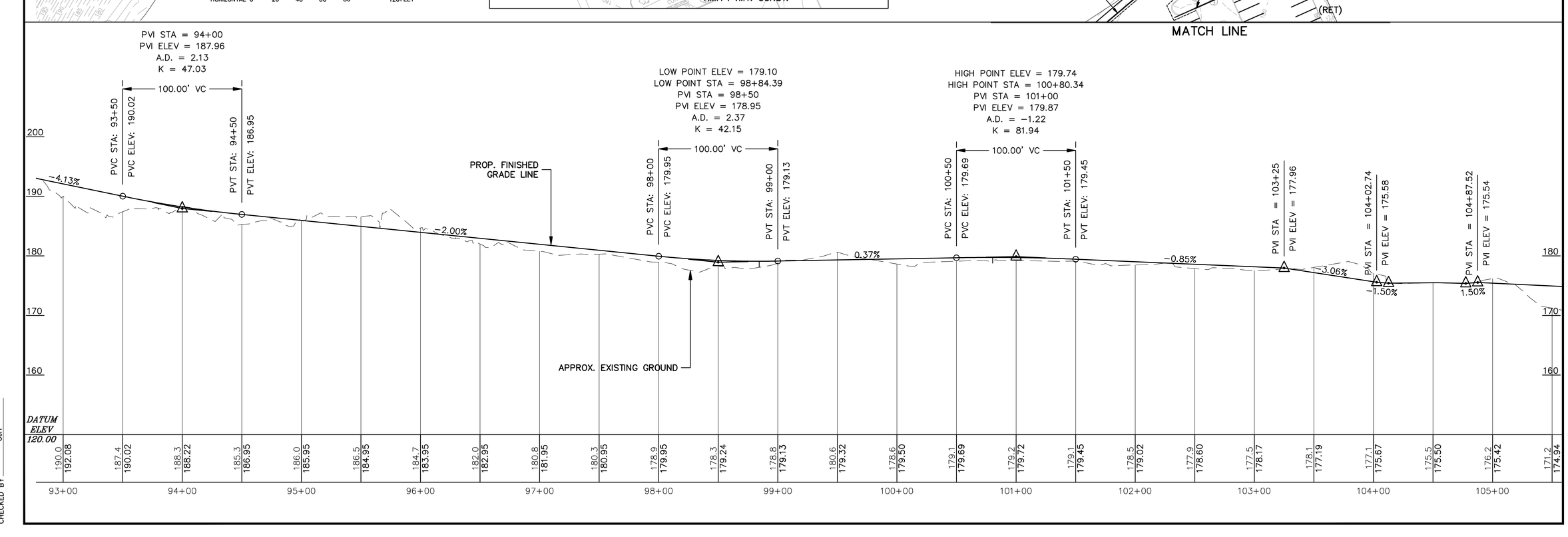
SEDIMENTATION FENCE AND HAYBALES
STA. 96+50 RT TO STA. 99+00 RT
STA. 100+50 RT TO STA. 104+00 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	32	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE





IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

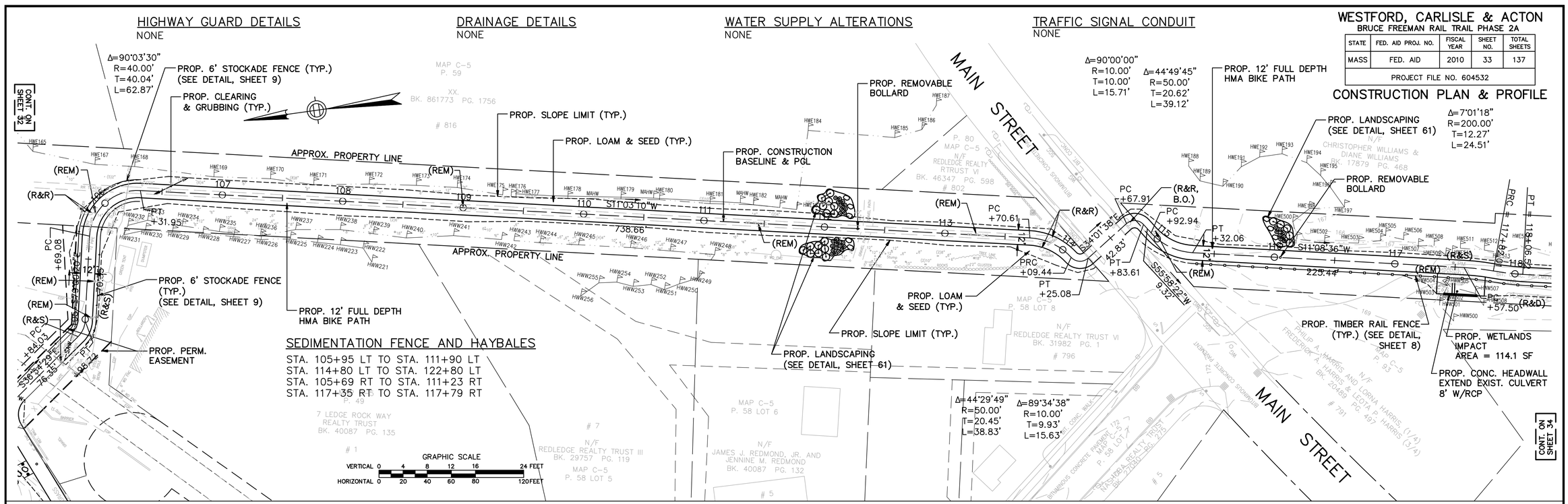
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

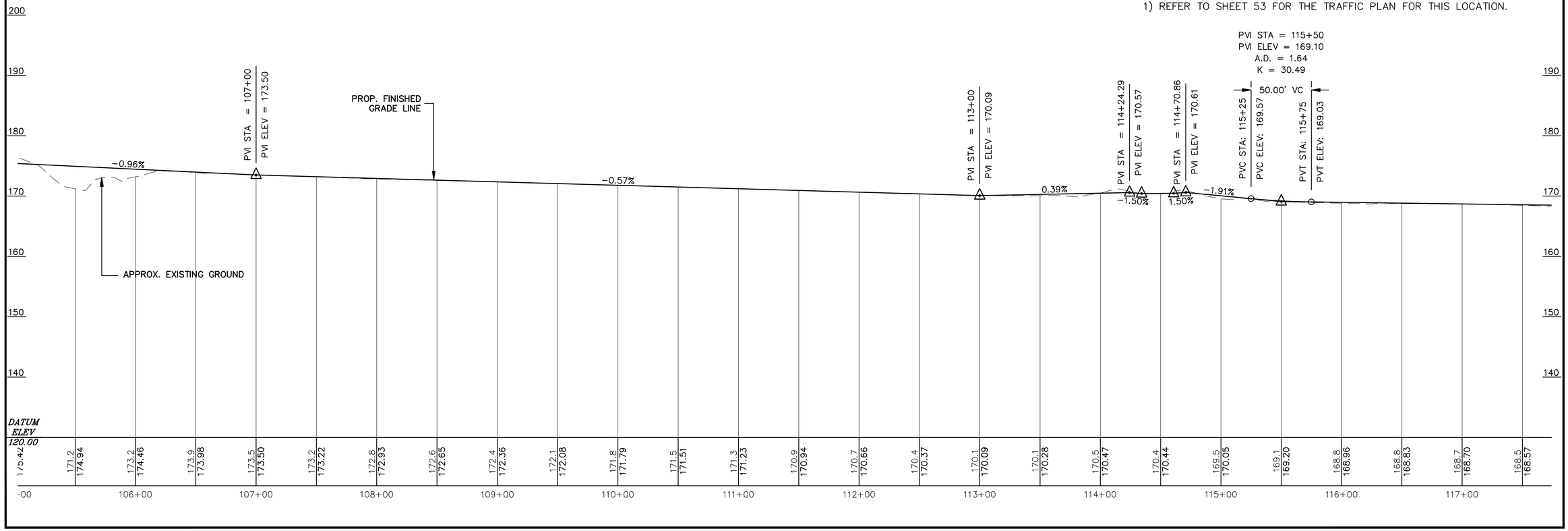
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	33	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



NOTE:
1) REFER TO SHEET 53 FOR THE TRAFFIC PLAN FOR THIS LOCATION.



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

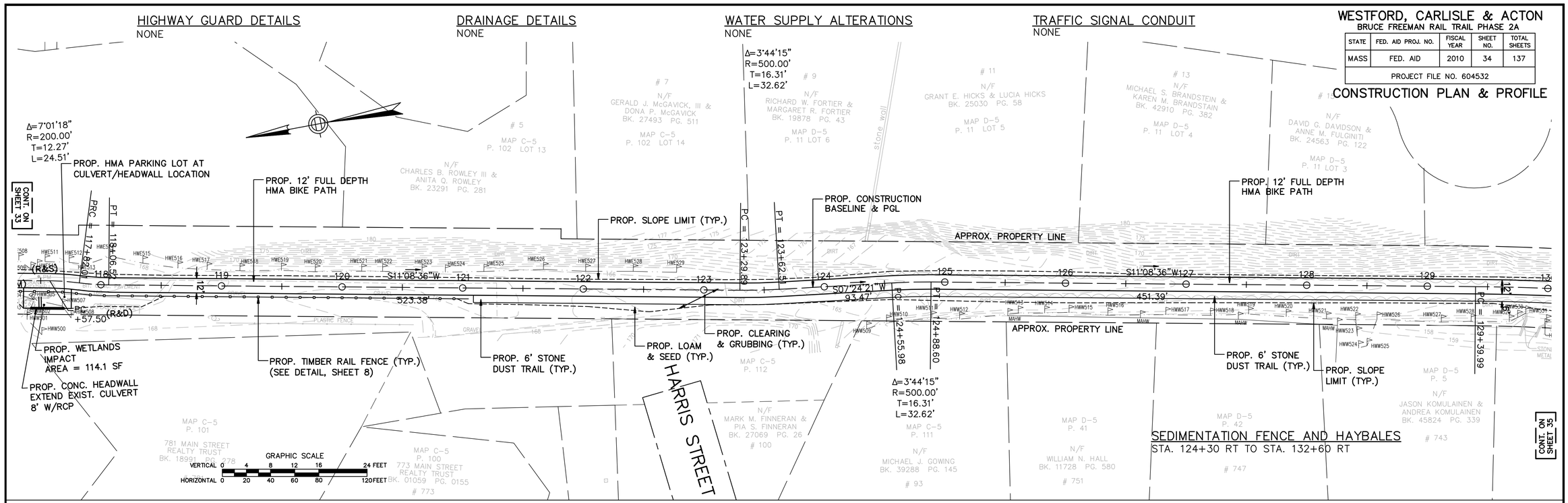
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

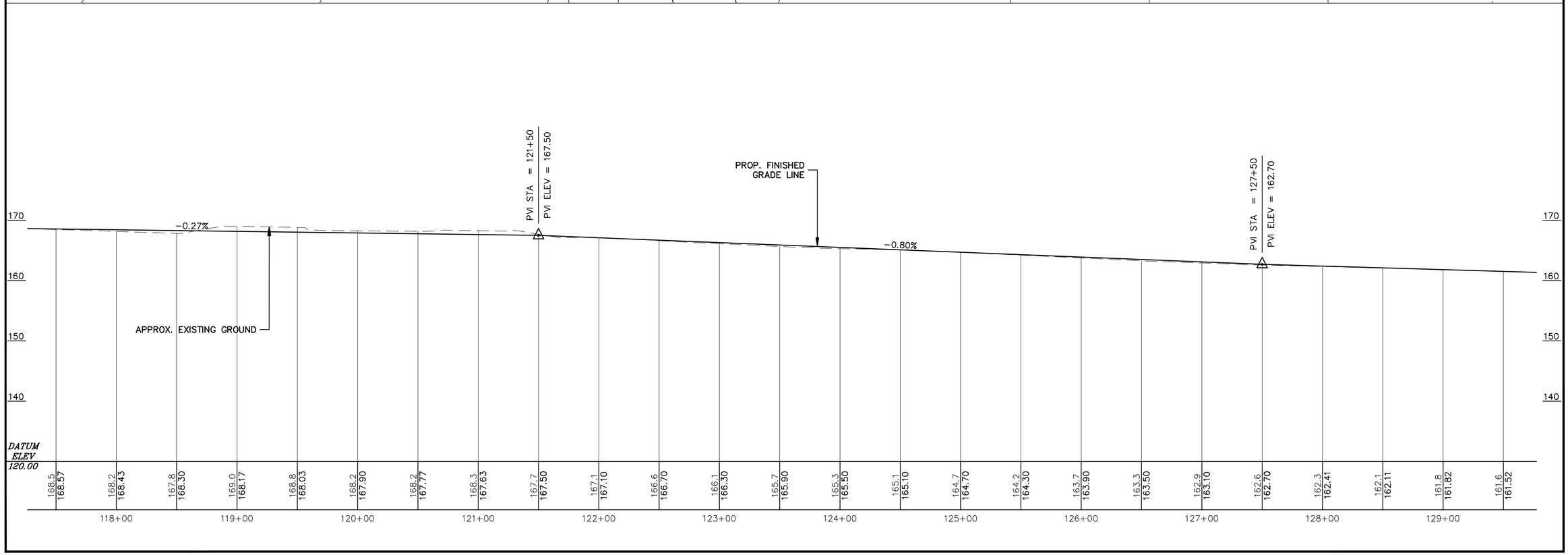
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	34	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 124+30 RT TO STA. 132+60 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

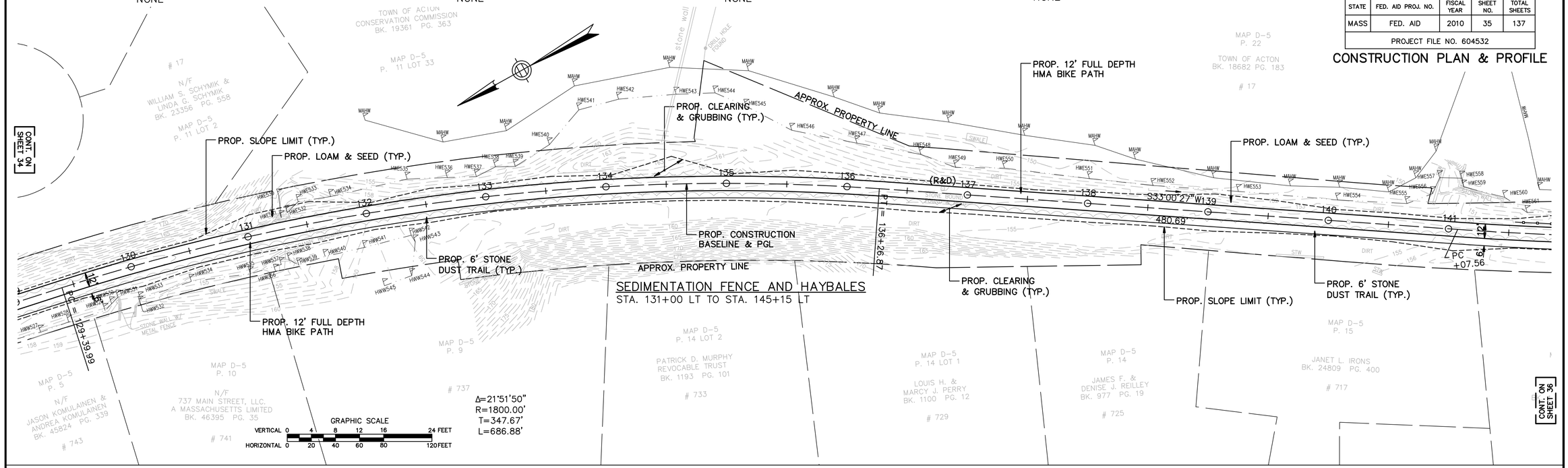
WATER SUPPLY ALTERATIONS
NONE

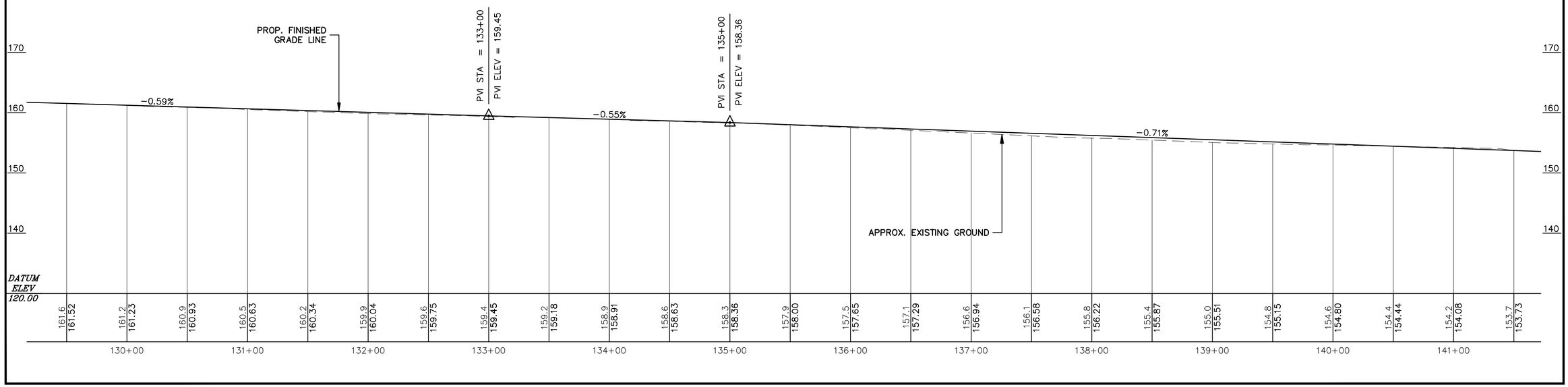
TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	35	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE





IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

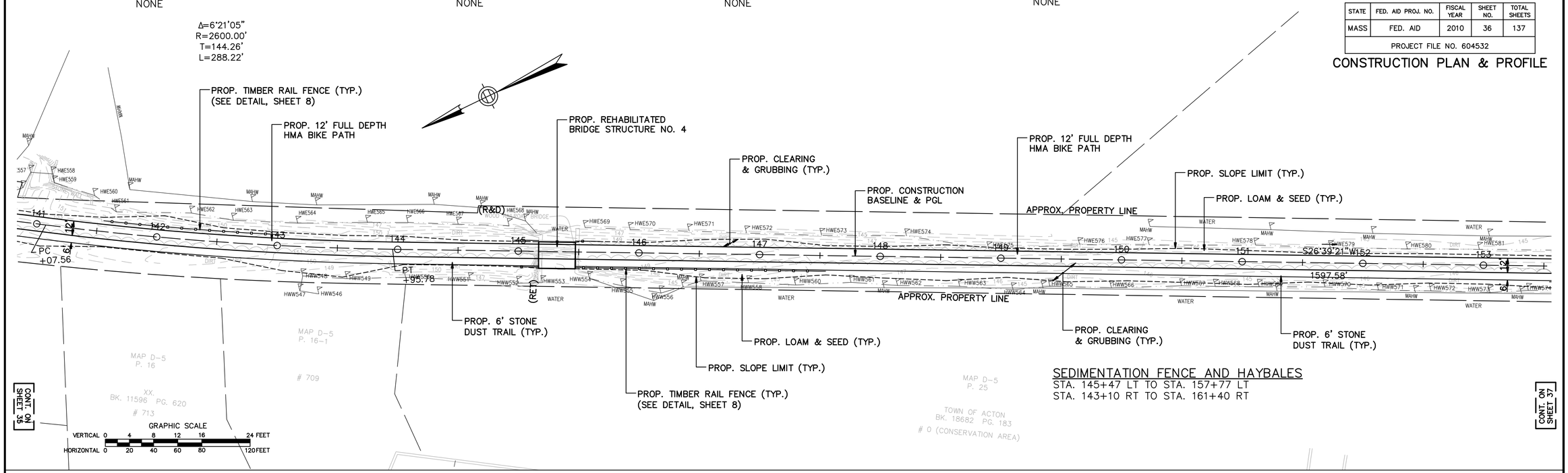
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

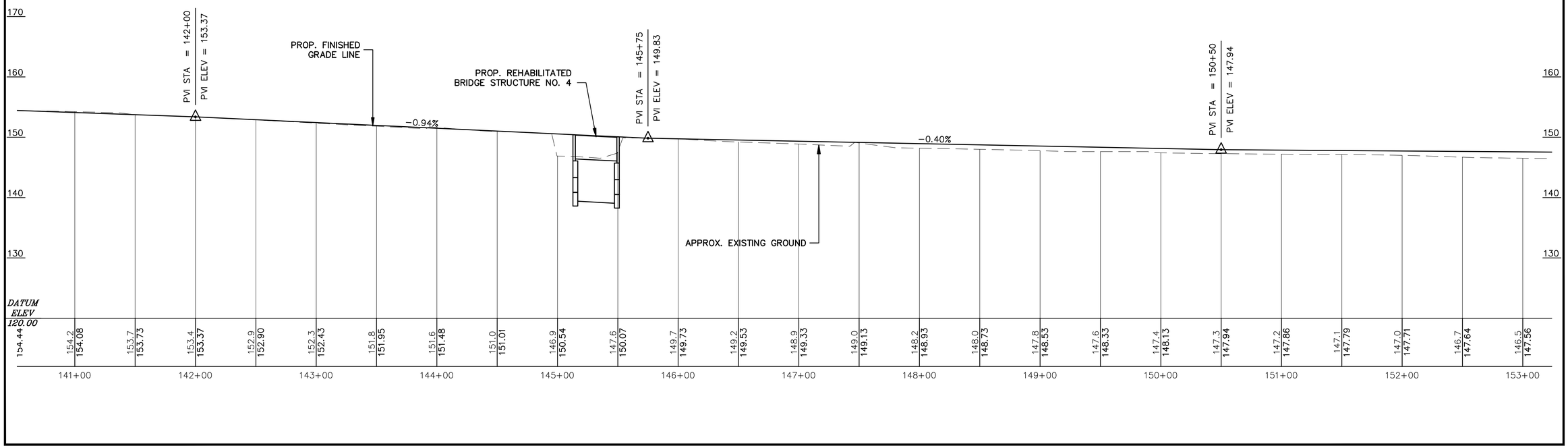
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	36	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 145+47 LT TO STA. 157+77 LT
STA. 143+10 RT TO STA. 161+40 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

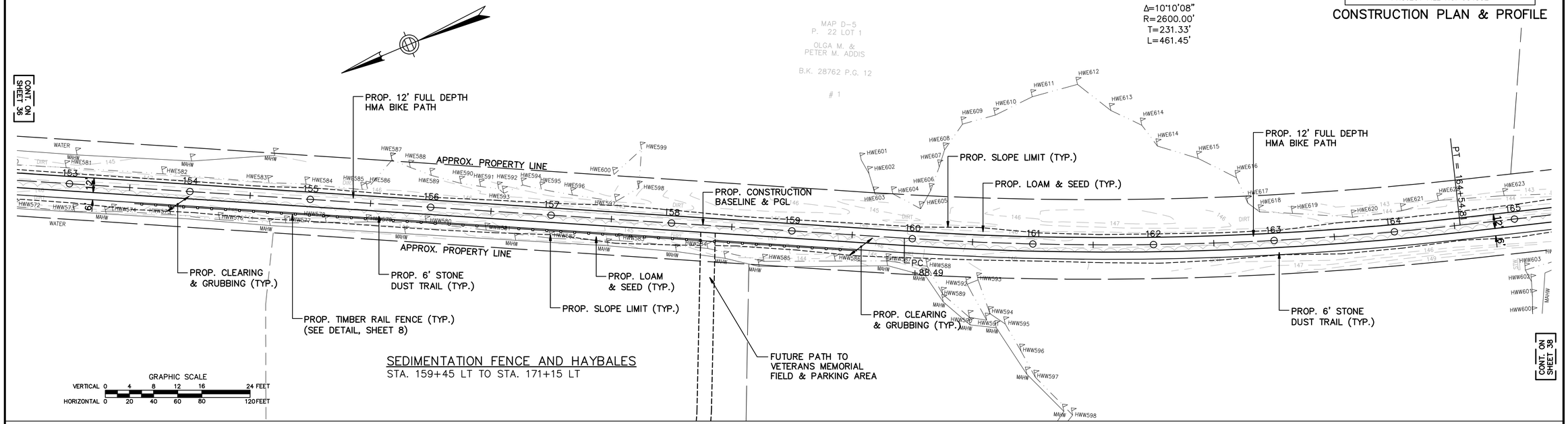
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

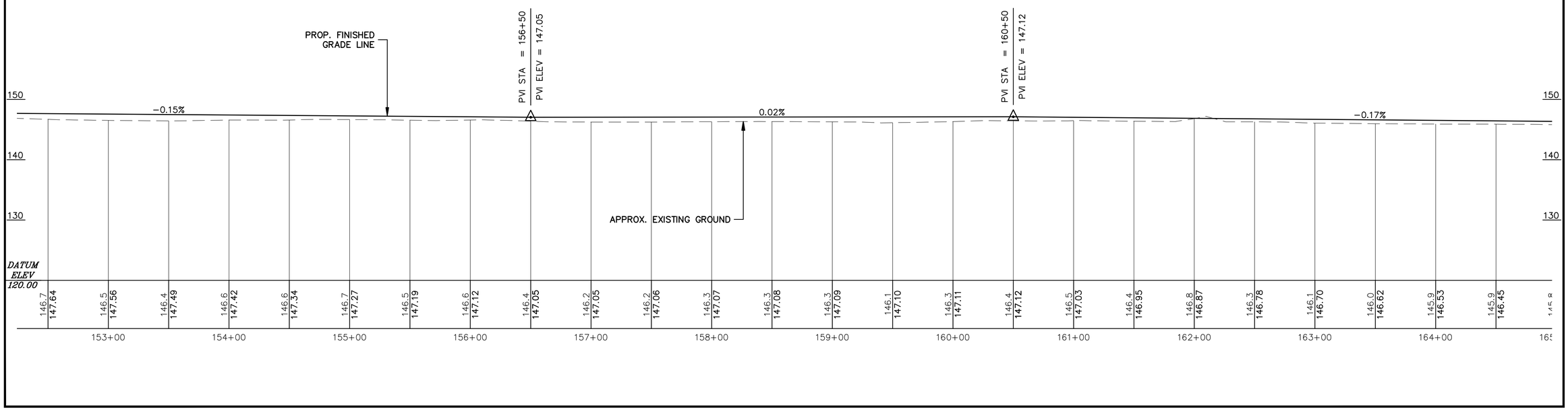
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	37	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 159+45 LT TO STA. 171+15 LT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

WATER SUPPLY ALTERATIONS
NONE

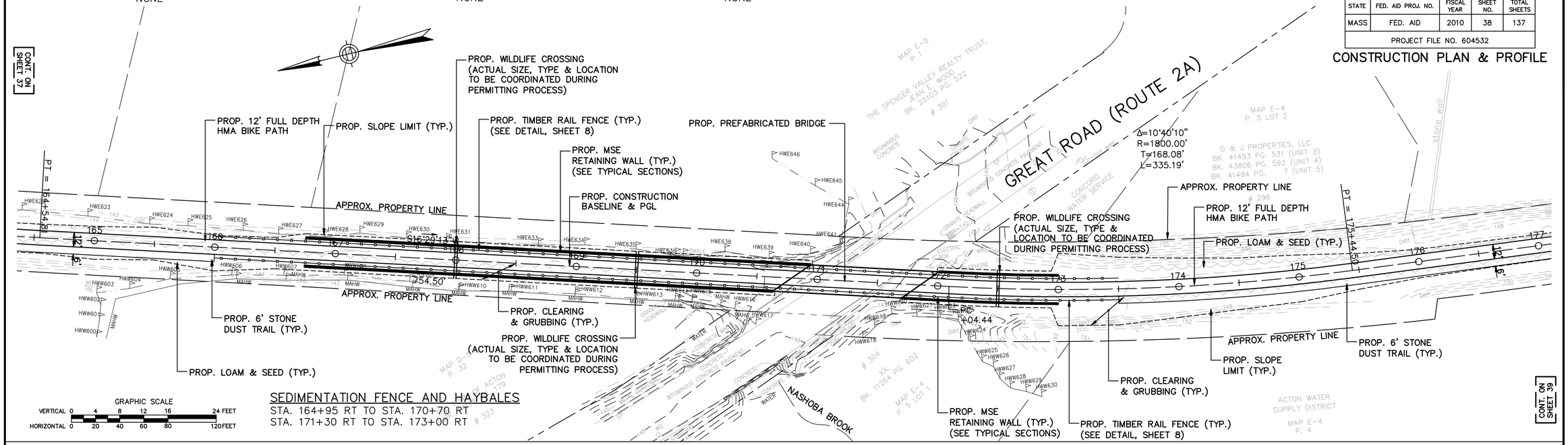
TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	38	137
PROJECT FILE NO. 604532				

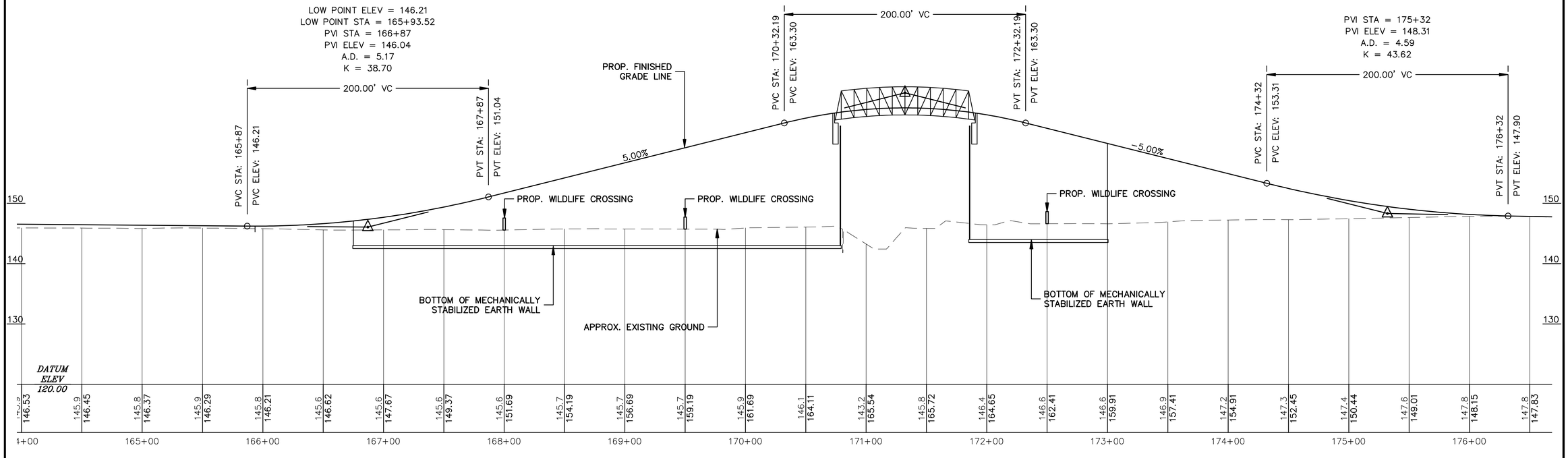
CONSTRUCTION PLAN & PROFILE

CONT. ON SHEET 37



SEDIMENTATION FENCE AND HAYBALES
STA. 164+95 RT TO STA. 170+70 RT
STA. 171+30 RT TO STA. 173+00 RT

CONT. ON SHEET 39



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

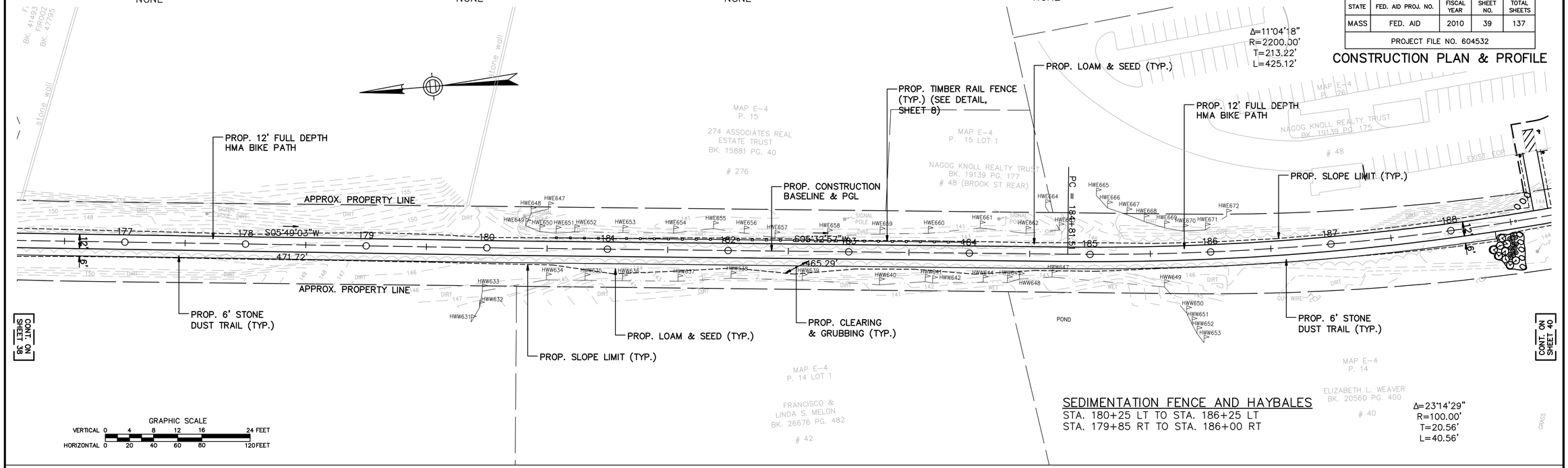
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

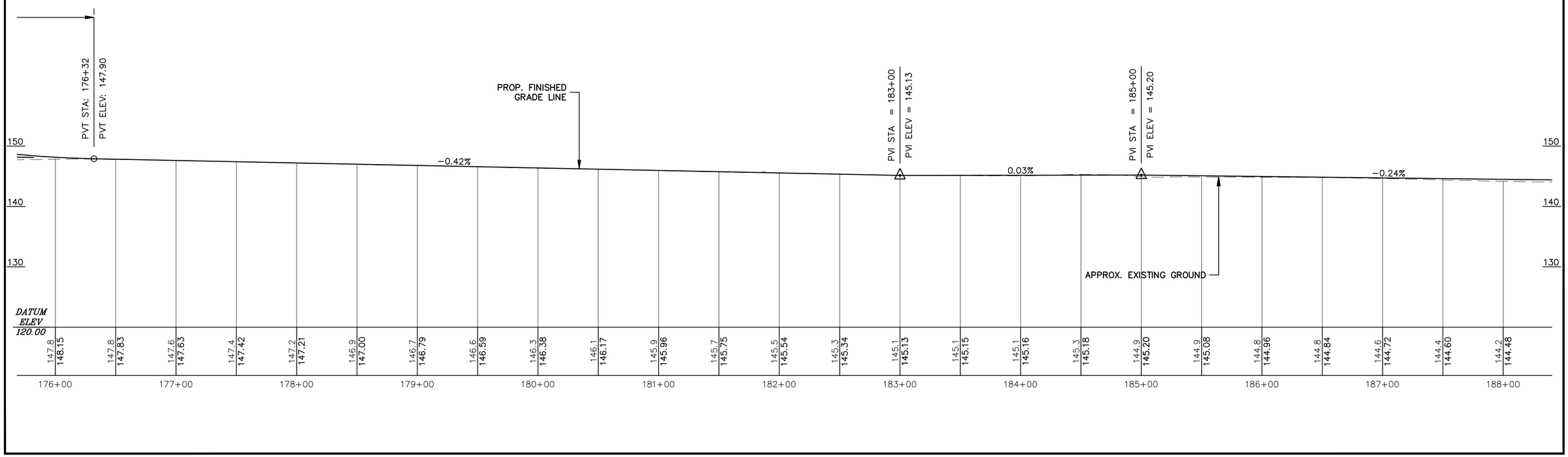
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	39	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120FEET

SEDIMENTATION FENCE AND HAYBALES
STA. 180+25 LT TO STA. 186+25 LT
STA. 179+85 RT TO STA. 186+00 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

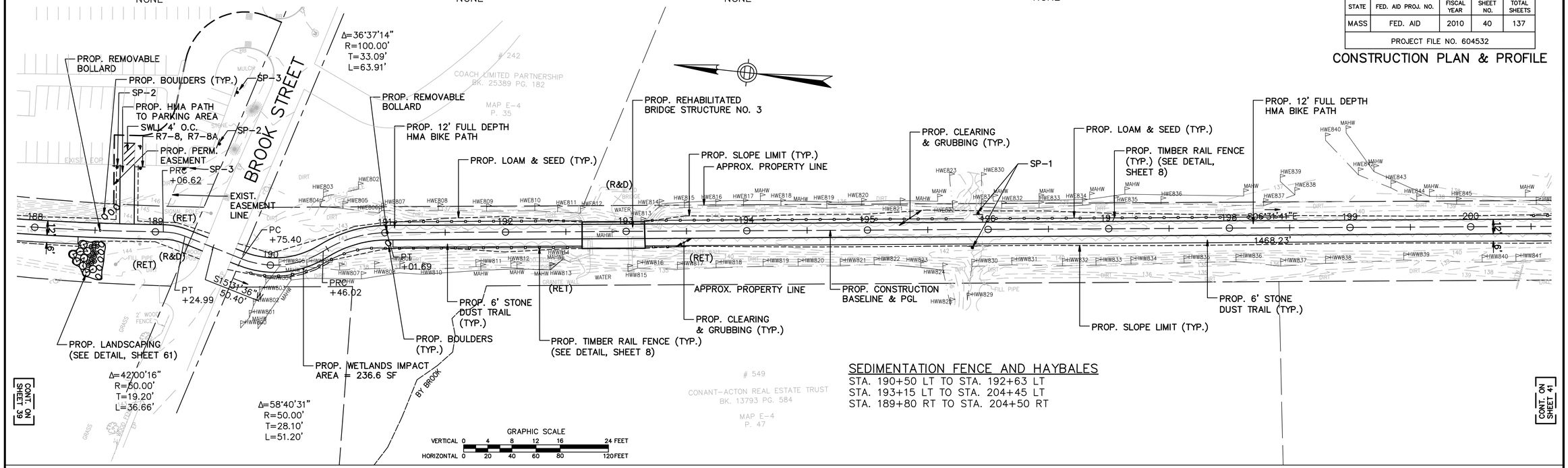
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

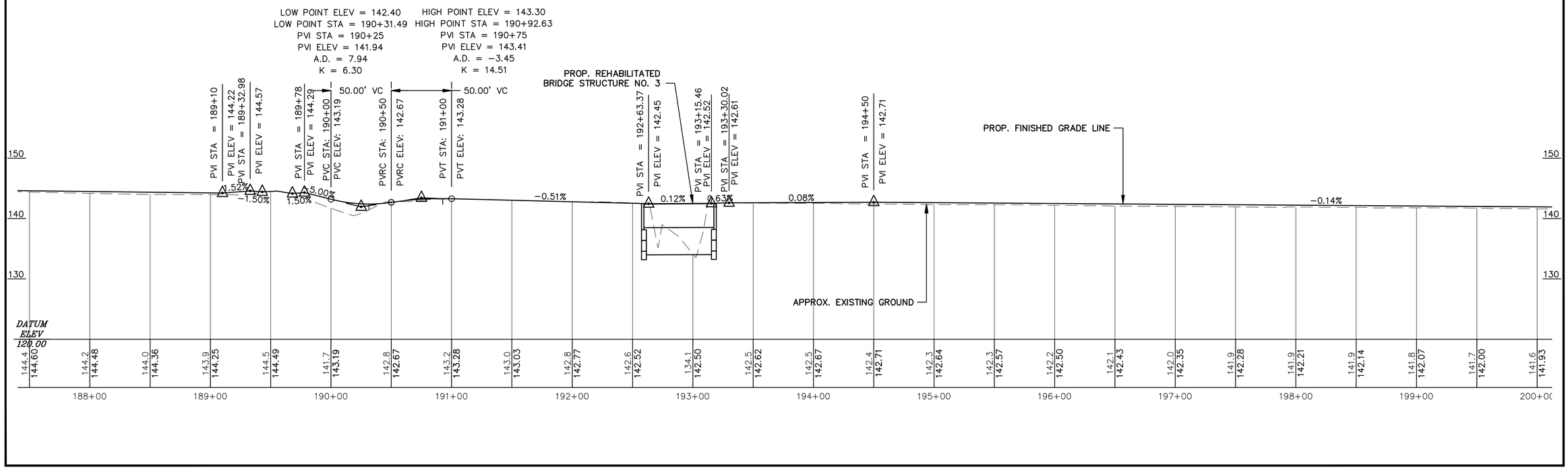
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	40	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 190+50 LT TO STA. 192+63 LT
STA. 193+15 LT TO STA. 204+45 LT
STA. 189+80 RT TO STA. 204+50 RT

NOTE:
1) REFER TO SHEET 54 FOR THE TRAFFIC PLAN FOR THIS LOCATION.



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

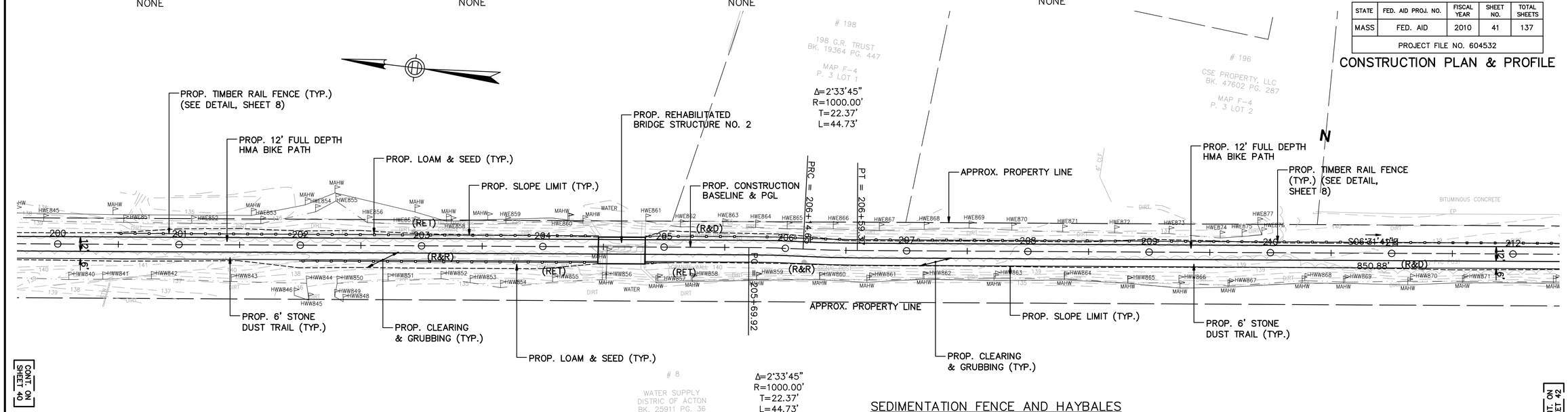
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

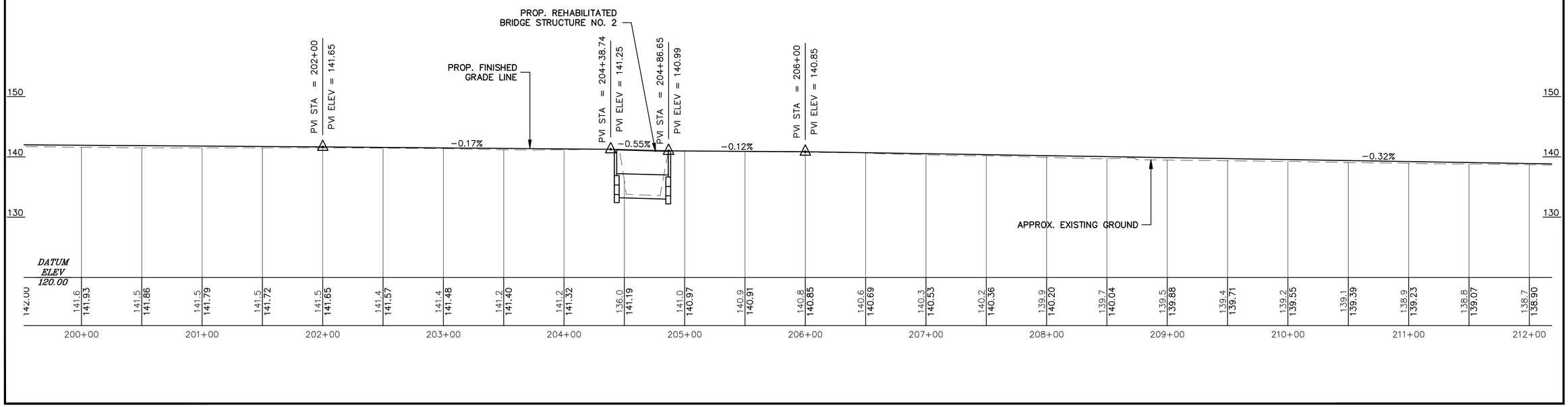
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	41	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120FEET

SEDIMENTATION FENCE AND HAYBALES
STA. 204+85 LT TO STA. 209+95 LT
STA. 204+90 RT TO STA. 247+50 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

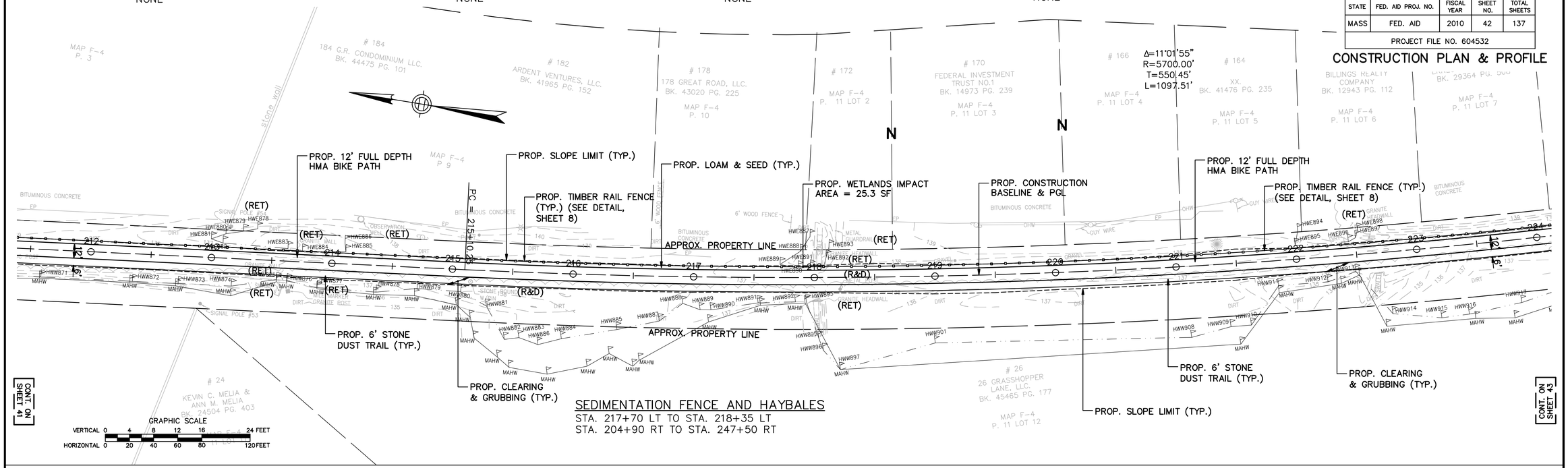
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

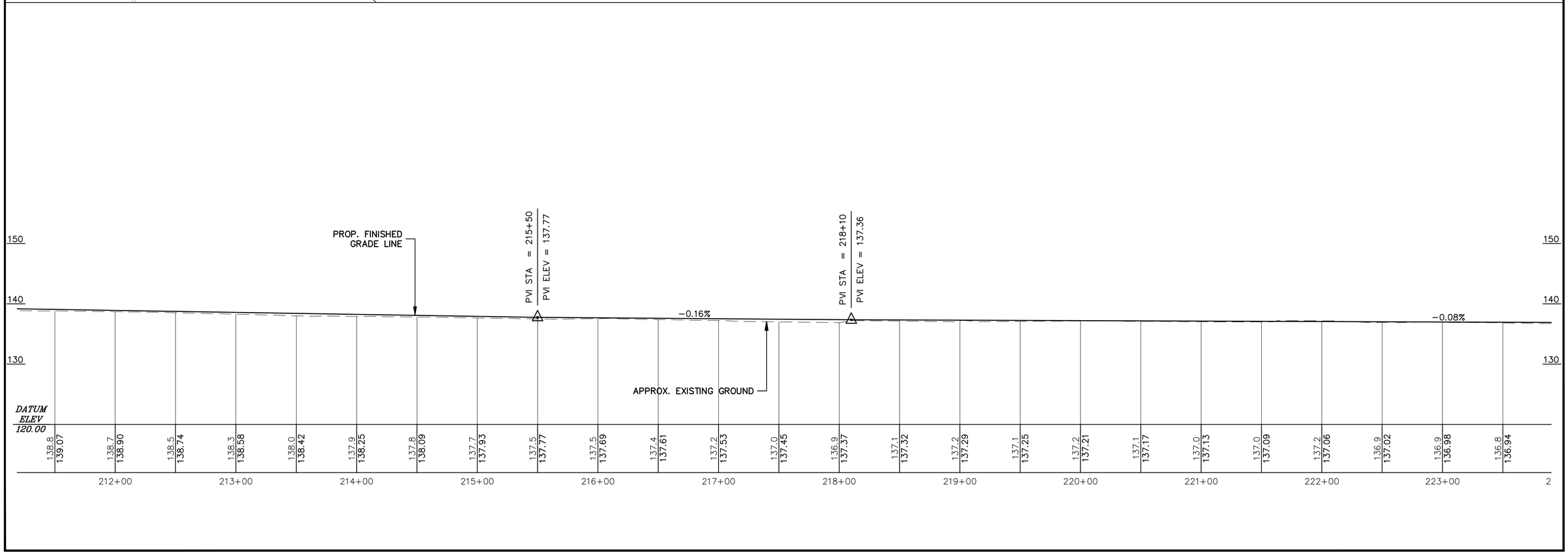
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	42	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120FEET

SEDIMENTATION FENCE AND HAYBALES
STA. 217+70 LT TO STA. 218+35 LT
STA. 204+90 RT TO STA. 247+50 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

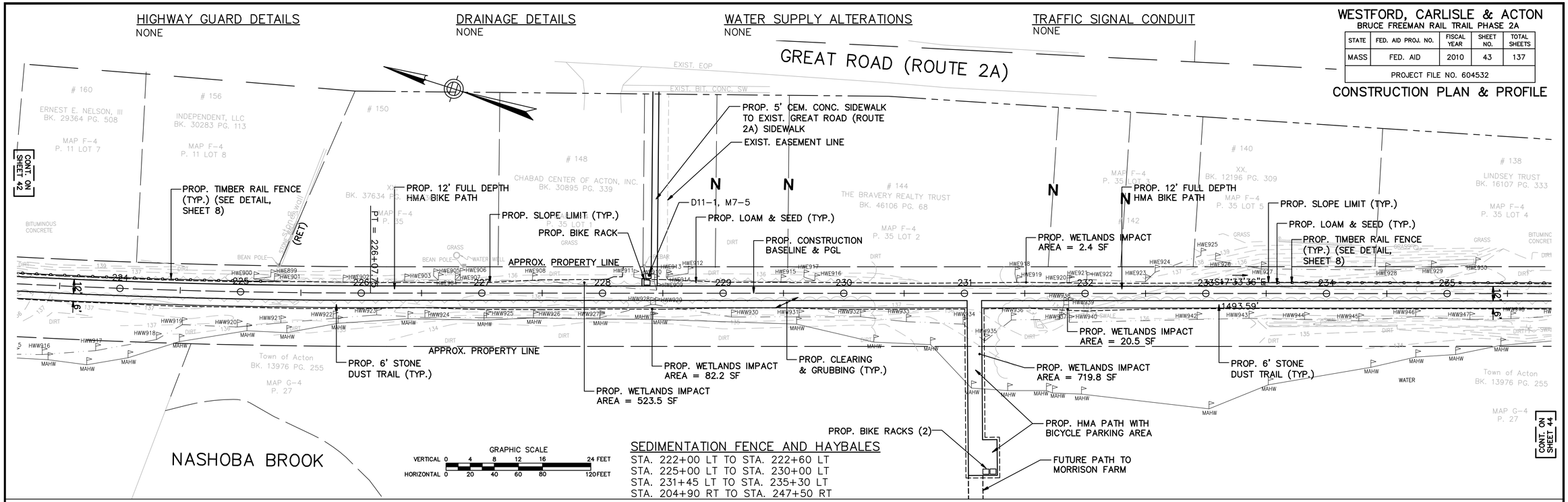
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

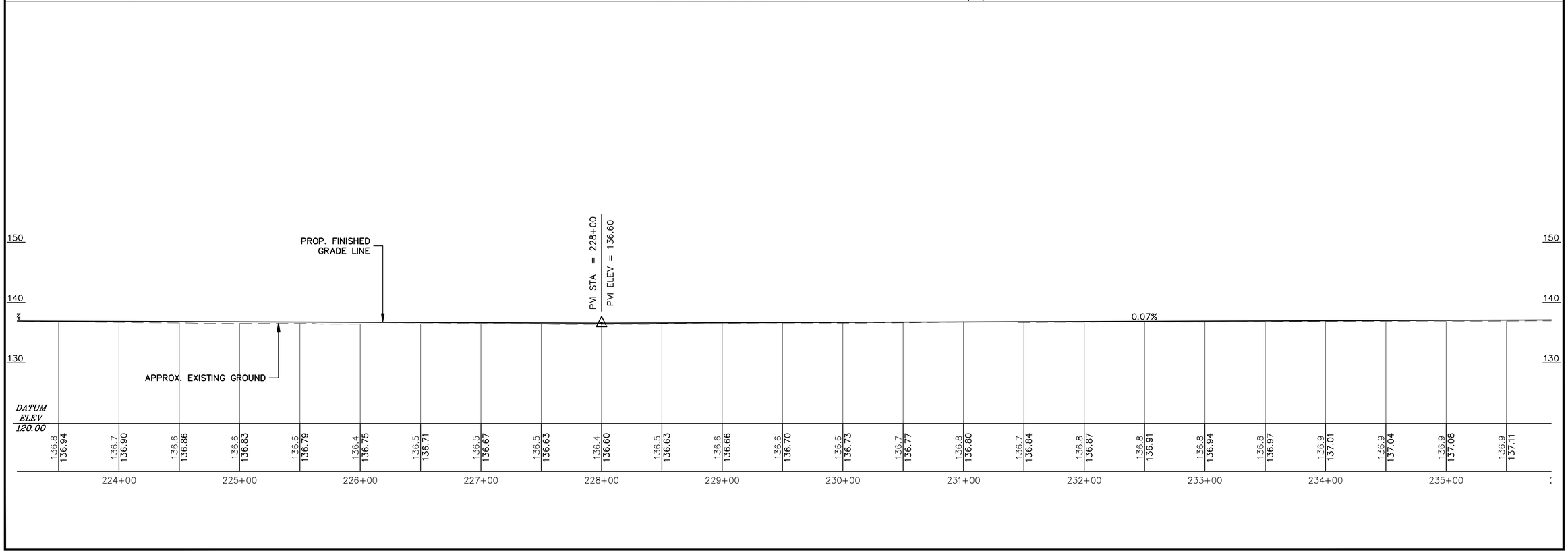
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	43	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 222+00 LT TO STA. 222+60 LT
STA. 225+00 LT TO STA. 230+00 LT
STA. 231+45 LT TO STA. 235+30 LT
STA. 204+90 RT TO STA. 247+50 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

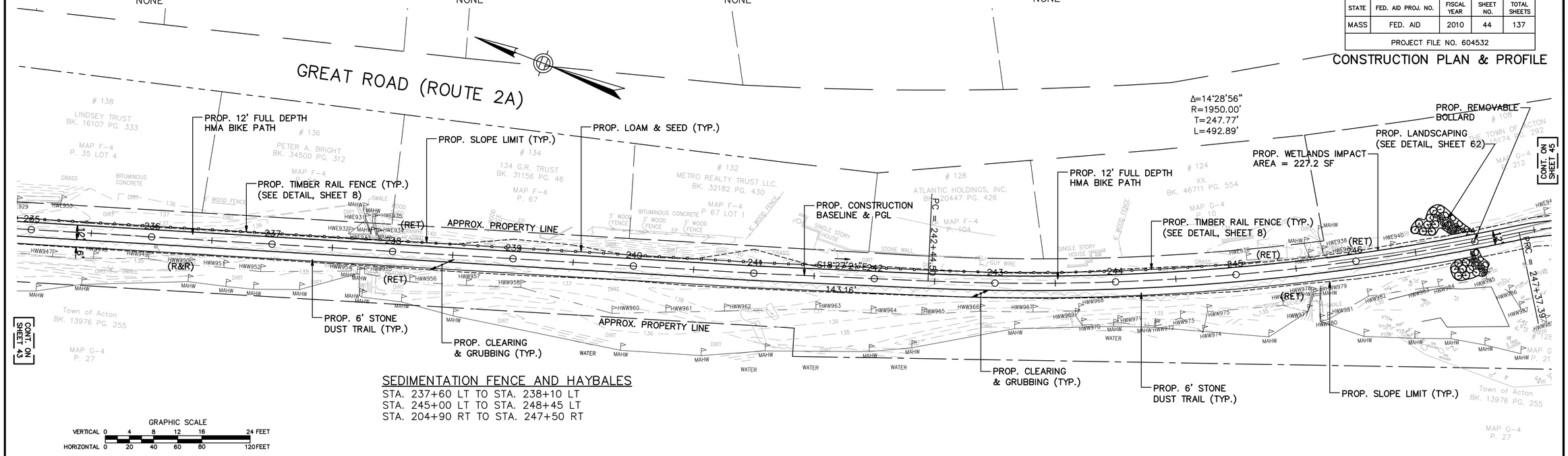
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

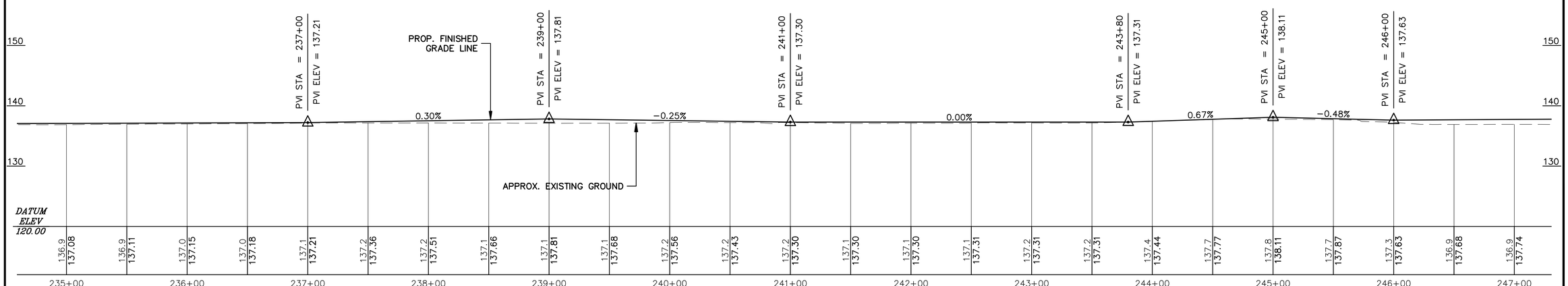
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	44	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



GRAPHIC SCALE
VERTICAL 0 4 8 12 16 24 FEET
HORIZONTAL 0 20 40 60 80 120FEET

SEDIMENTATION FENCE AND HAYBALES
STA. 237+60 LT TO STA. 238+10 LT
STA. 245+00 LT TO STA. 248+45 LT
STA. 204+90 RT TO STA. 247+50 RT



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

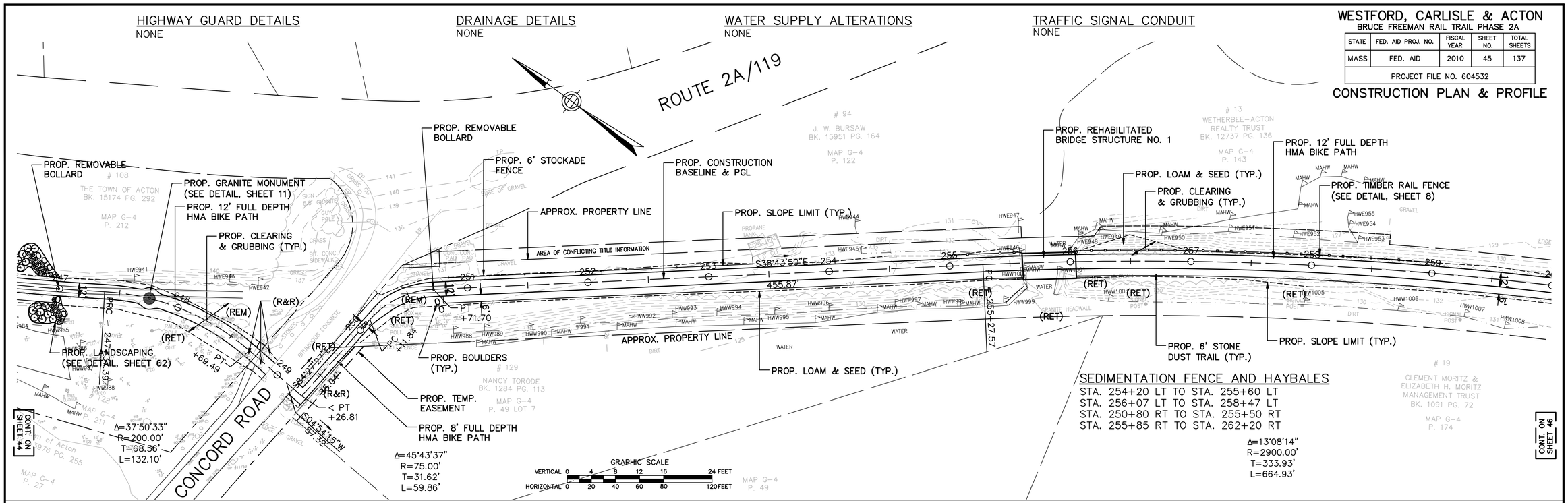
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

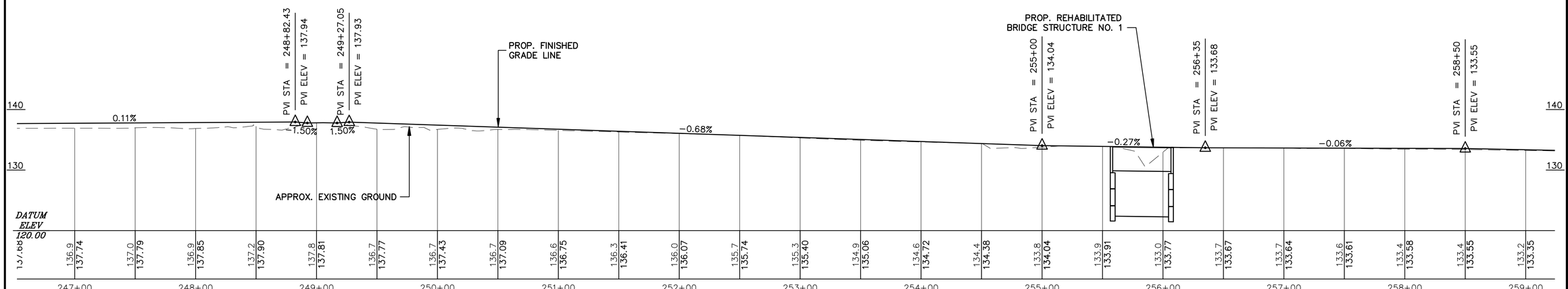
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	45	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



SEDIMENTATION FENCE AND HAYBALES
STA. 254+20 LT TO STA. 255+60 LT
STA. 256+07 LT TO STA. 258+47 LT
STA. 250+80 RT TO STA. 255+50 RT
STA. 255+85 RT TO STA. 262+20 RT

NOTE:
1) REFER TO SHEET 55 FOR THE TRAFFIC PLAN FOR THIS LOCATION.



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

HIGHWAY GUARD DETAILS
NONE

DRAINAGE DETAILS
NONE

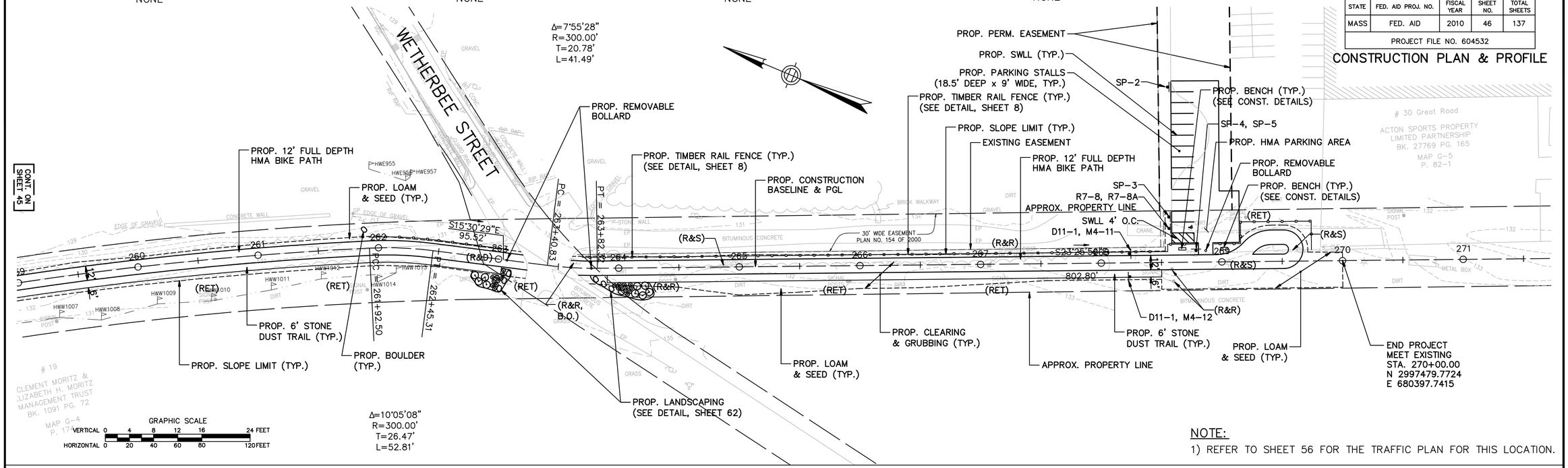
WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

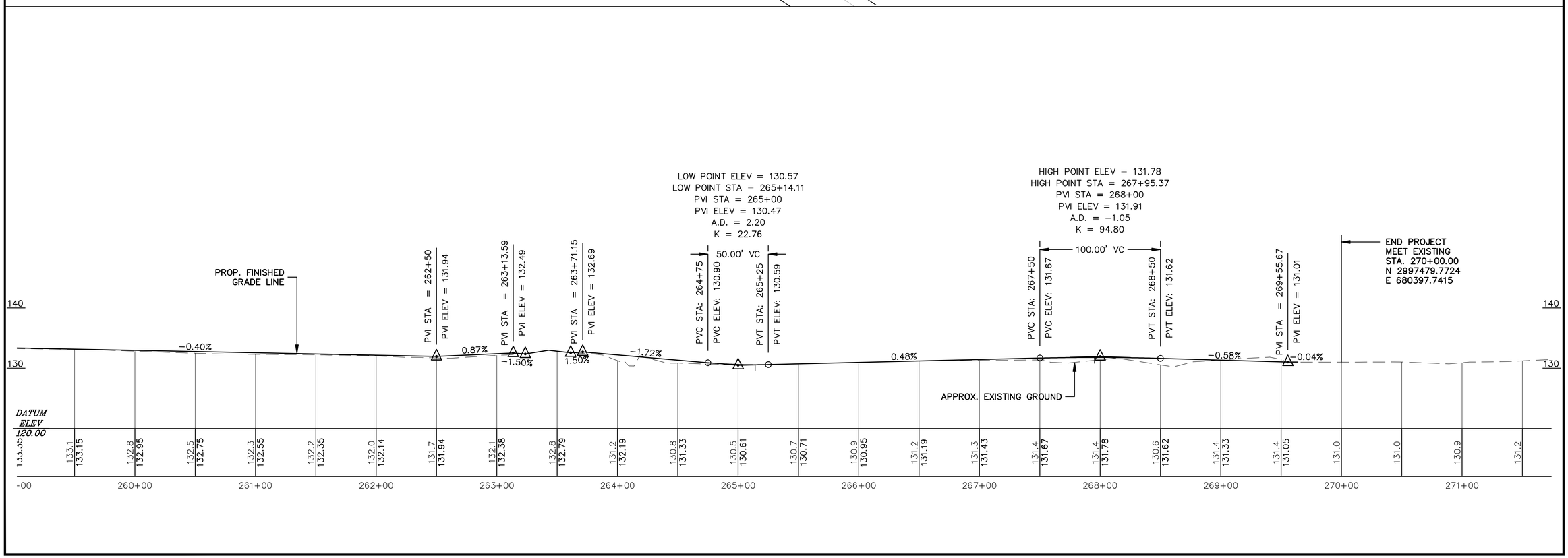
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	46	137
PROJECT FILE NO. 604532				

CONSTRUCTION PLAN & PROFILE



NOTE:
1) REFER TO SHEET 56 FOR THE TRAFFIC PLAN FOR THIS LOCATION.

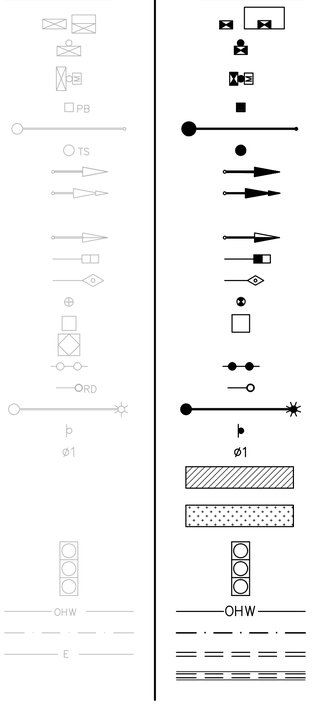


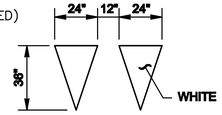
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

TRAFFIC SIGNAL LEGEND

EXISTING | PROPOSED

- CONTROL CABINET GROUND MOUNTED (WITH & WITHOUT CONC. PAD)
- CONTROL CABINET POLE MOUNTED
- FLASHING BEACON CONTROL & METER PEDESTAL
- PULL BOX (12" x 12" OR AS NOTED)
- MAST ARM, SHAFT & BASE (ARM LENGTH AS NOTED)
- SIGNAL POST & BASE (ALPHA–NUMERIC DESIGNATION NOTED)
- VEHICULAR SIGNAL HEAD (ALPHA–NUMERIC DESIGNATION NOTED)
- VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED (ALPHA–NUMERIC DESIGNATION NOTED)
- FLASHING BEACON (ALPHA–NUMERIC DESIGNATION NOTED)
- PEDESTRIAN SIGNAL HEAD (ALPHA–NUMERIC DESIGNATION NOTED)
- EMERGENCY PREEMPTION DETECTOR (OPTICOM)
- PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
- WIRE LOOP DETECTOR (6' x 6' OR AS NOTED)
- HIGH MAST POLE OR TOWER
- MAGNETOMETER
- RADAR DETECTOR
- SIGNAL & LIGHTING MAST ARM
- TRAFFIC SIGN & POST
- CONTROLLER PHASE ACTUATED
- ZONE OF DETECTION FOR SPECIAL DETECTORS
- ZONE OF VISIBILITY FOR PROGRAMMED SIGNAL
- TRAFFIC SIGNAL HEAD (12" LENSES OR AS NOTED)
- OVERHEAD WIRE(S)
- DIRECT BURIAL CABLE
- TRAFFIC SIGNAL CONDUIT
- CONDUIT CROSSING ROADWAY WITH FLOWABLE FILL





YIELD LINE MARKINGS
NOT TO SCALE

GENERAL ABBREVIATIONS

MAX	MAXIMUM
MIN	MINIMUM
BO	BY OTHERS
PROP	PROPOSED
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
REM	REMOVE
RET	RETAIN

TRAFFIC ABBREVIATIONS

R	STEADY CIRCULAR RED
Y	STEADY CIRCULAR AMBER
G	STEADY CIRCULAR GREEN
RL	STEADY RED LEFT ARROW
YL	STEADY AMBER LEFT ARROW
GL	STEADY GREEN LEFT ARROW
GV	STEADY GREEN VERTICAL ARROW
RR	STEADY RED RIGHT ARROW
YR	STEADY AMBER RIGHT ARROW
GR	STEADY GREEN RIGHT ARROW
FR	FLASHING CIRCULAR RED
FY	FLASHING CIRCULAR AMBER
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
W	WALK – LUNAR WHITE
DW	DON'T WALK – PORTLAND ORANGE
FDW	FLASHING DON'T WALK – PORTLAND ORANGE
L	DETECTOR – LOCK
NL	DETECTOR – NON–LOCK
	VEHICLE MOVEMENT
	PEDESTRIAN MOVEMENT
	PERMISSIVE VEHICULAR MOVEMENT
	DETECTOR CONTROLLING PHASE

ONLY SHOWN ON PHASING DIAGRAMS

DON'T WALK / WALK

GENERAL NOTES

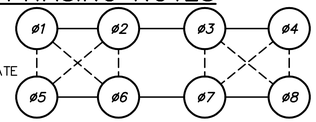
1. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS NOTED OTHERWISE.
2. ALL PROPOSED PAVEMENT MARKINGS FOR THE ROADWAY SHALL BE THERMOPLASTIC. ALL PROPOSED PAVEMENT MARKINGS FOR THE BIKE PATH SHALL BE PAINTED.
3. ALL GROUND MOUNTED SIGNS SHALL HAVE A LATERAL CLEARANCE OF 3 FEET TO 6 FEET MEASURED FROM THE NEAR EDGE OF THE SIGN TO THE NEAR EDGE OF THE BIKE TRAIL.
4. ALL GROUND MOUNTED SIGNS SHALL HAVE A HEIGHT OF 4 FEET TO 5 FEET MEASURED FROM THE BOTTOM EDGE OF THE SIGN TO THE NEAR EDGE OF THE BIKE TRAIL SURFACE.
5. THE LOCATIONS OF ALL PROPOSED BOLLARDS ARE SHOWN ON THE CONSTRUCTION PLANS.
6. TO AVOID CONFUSION WITH THE BASELINE, THE CENTERLINE STRIPE FOR THE BIKE TRAIL IS NOT SHOWN ON THE TRAFFIC PLANS. THE SOLID YELLOW CENTER LINE SHALL RUN 200' IN ADVANCE OF EACH STOP LINE PROPOSED AT ROADWAY CROSSINGS.

TRAFFIC SIGNAL NOTES

1. SEE CONSTRUCTION AND TRAFFIC PLANS FOR ADDITIONAL DETAILS.
2. PROPOSED CONTROLLERS SHALL BE A NEMA TS2, KEYBOARD ENTRY, MENU–DRIVEN TYPE WITH INTERNAL COORDINATION CAPABILITIES, UNLESS OTHERWISE NOTED IN MAJOR ITEMS.
3. POLE–MOUNTED SIGNALS SHALL BE MOUNTED TO PROVIDE A 2–FOOT MINIMUM CLEARANCE BETWEEN VERTICAL PROJECTION OF THE CURBLINE AND THE SIGNAL VISOR. WHEN FEASIBLE, INSTALL AT BACK OF SIDEWALK UNLESS OTHERWISE NOTED. PROVIDE SPECIAL MOUNTING HARDWARE AS REQUIRED.
4. CONSTRUCTION OF THE TRAFFIC CONTROL SIGNAL SYSTEMS SHOWN ON THE FOLLOWING DRAWINGS SHALL CONFORM TO THE MASSACHUSETTS HIGHWAY DEPARTMENT'S "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES", 1988 ED. AS AMENDED, AND THE FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", 2003 EDITION AS AMENDED.
5. ALL TRAFFIC CONTROL SIGNAL EQUIPMENT SHALL BE LISTED ON THE CURRENT MASS. HIGHWAY DEPARTMENT'S "APPROVED LIST" AND IS SUBJECT TO THE APPROVAL OF THE DESIGN ENGINEER AND/OR THE MASS. HIGHWAY DEPARTMENT.
6. ALL OVERHEAD CONDUCTORS FOR SIGNAL HOUSINGS SHALL BE STRANDED WIRE.
7. ALL PROPOSED LENSES SHALL HAVE TUNNEL VISORS. ALL MAST ARM MOUNTED SIGNALS SHALL BE RIGIDLY MOUNTED.
8. ALL PROPOSED WIRE LOOP DETECTORS SHALL BE CENTERED WITHIN RESPECTIVE LANES UNLESS OTHERWISE NOTED.
9. FLASHING OPERATION PER M.U.T.C.D., SECTION 4D–12.
10. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT SHALL NOT CHANGE DURING THE CHANGE INTERVAL(S).
11. ALL NEW TRAFFIC CONTROLLER CABINETS SHALL BE EQUIPPED WITH A LEVER–TYPE METER BY–PASS. SPECIFICATIONS FOR THE BY–PASS MUST BE APPROVED BY THE APPROPRIATE UTILITY COMPANY.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING AND VERIFYING THAT THERE IS SUFFICIENT CLEARANCE BETWEEN ALL PROPOSED TRAFFIC SIGNAL POLES AND EXISTING AND RELOCATED OVERHEAD UTILITY LINES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR COORDINATING WITH THE AFFECTED UTILITY COMPANIES RELATIVE TO THE SCOPE OF ANY REQUIRED RELOCATIONS. THIS SHALL BE PERFORMED WITHIN TEN DAYS AFTER AWARD OF THE CONTRACT. THE COST FOR RELOCATION OF UTILITIES SHALL BE BORNE BY THE OWNER.
13. WHERE CALLED FOR ON THE PLANS, THE PROPOSED LOCATIONS OF THE OPTICOM DETECTOR UNITS AND CONFIRMATION BEACON ARE PERCEIVED BEST BUT NOT FINAL. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE OPTIMUM PLACEMENT IN COOPERATION WITH THE LOCAL MUNICIPALITY'S FIRE FIGHTING DEPARTMENT. THE OPTICAL DETECTOR UNITS SHALL HAVE AN UNOBSTRUCTED LINE–OF–SIGHT VIEW ALONG THE ROUTE OF APPROACHING PRIORITY VEHICLE.
14. THE CONTRACTOR SHALL REMOVE AND STACK ALL EXISTING TRAFFIC SIGNAL EQUIPMENT WITHIN THE PROJECT LIMITS EXCEPT FOR LOCATIONS NOTED ON THE PLANS.

NEMA DUAL RING PHASING NOTES

1. PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.



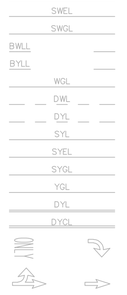
LOOP DETECTOR NOTES

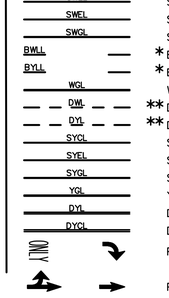
1. SEE LOOP DETECTOR DETAIL SHEET FOR SPLICE PATTERN AND OTHER INFORMATION.
2. DELAY AND EXTENSION TIMES ARE IN SECONDS.
3. DELAY TIME SHALL BE EFFECTIVE ONLY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY A DETECTOR.

PAVEMENT MARKING LEGEND

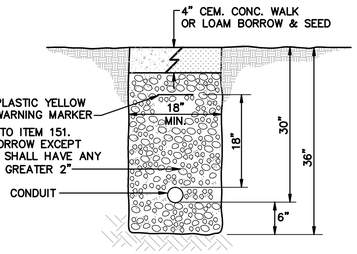
EXISTING | PROPOSED

- STOP LINE – 12"
- CROSSWALK – 2–12" WHITE LINES
- SOLID WHITE LANE LINE – 4"
- SOLID WHITE EDGE LINE – 4"
- SOLID WHITE GORE LINE – 8"
- *BROKEN WHITE LANE LINE – 4"
- *BROKEN YELLOW LANE LINE – 4"
- WHITE GORE LINE – 12"
- **DASHED WHITE LINE – 4"
- **DASHED YELLOW LINE – 4"
- SOLID YELLOW CENTER LINE – 4"
- SOLID YELLOW EDGE LINE – 4"
- SOLID YELLOW GORE LINE – 8"
- YELLOW GORE LINE – 12"
- DOUBLE YELLOW LINE – 2–4"
- DOUBLE YELLOW CENTER LINE – 2–4"
- PAVEMENT ARROW & LEGEND
- PAVEMENT ARROWS

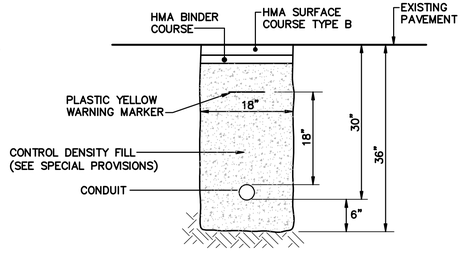




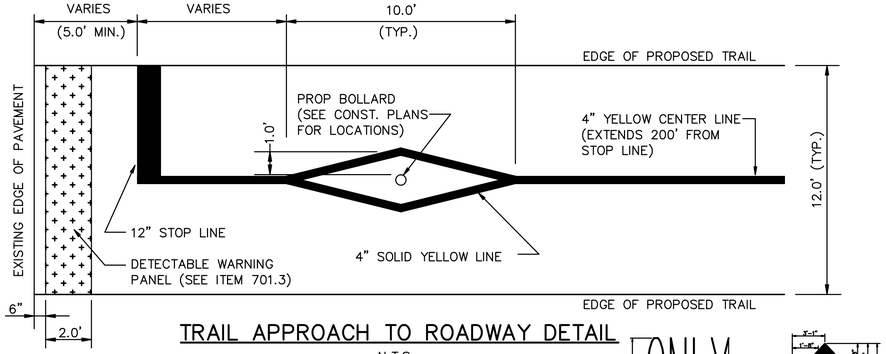
*BROKEN LANE LINES TO BE 10' IN LENGTH WITH 30' GAP (TYP.)
**DASHED LINES TO BE 5' IN LENGTH WITH 5' GAP (TYP.)



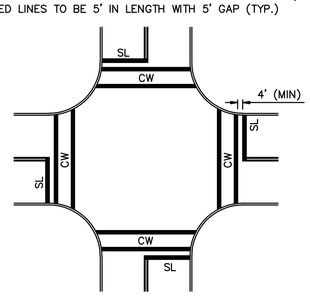
TRAFFIC SIGNAL CONDUIT TRENCH DETAIL (IN SIDEWALK OR LANDSCAPE AREA)
NOT TO SCALE



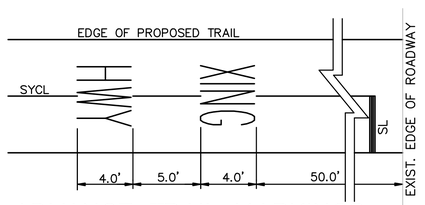
TRAFFIC SIGNAL CONDUIT TRENCH DETAIL CROSSING ROADWAY (OUTSIDE FULL DEPTH AREA)
NOT TO SCALE



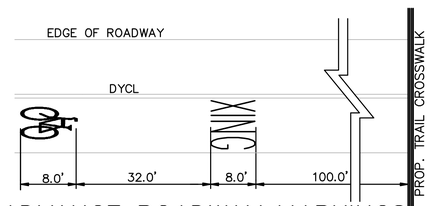
TRAIL APPROACH TO ROADWAY DETAIL
N.T.S.



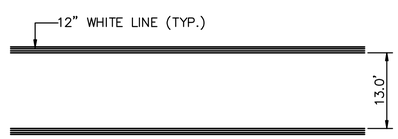
TYPICAL INTERSECTION MARKINGS
NOT TO SCALE



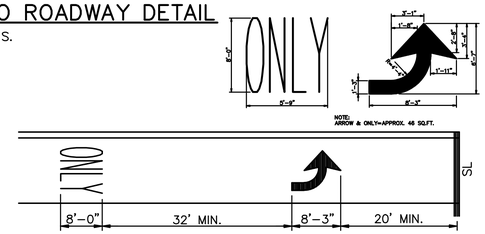
ADVANCE TRAIL MARKINGS AT ROADWAY XING
NOT TO SCALE



ADVANCE ROADWAY MARKINGS AT TRAIL XING
NOT TO SCALE



CROSSWALK DETAIL
NOT TO SCALE



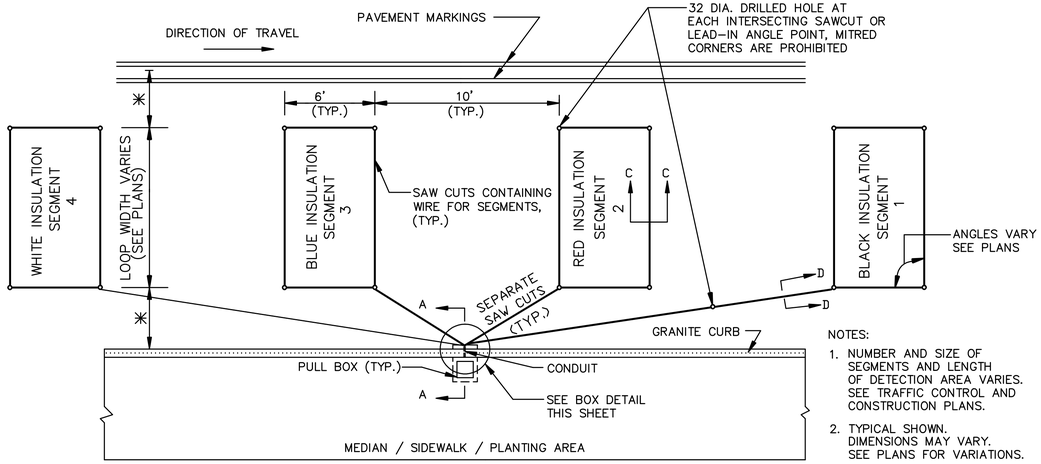
ARROW & ONLY DETAIL
NOT TO SCALE

IN CHARGE OF GJH
DESIGNED BY TQN
CHECKED BY JWD
DRAWN BY TQN
CHECKED BY JWD

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	47	137
PROJECT FILE NO. 604532				

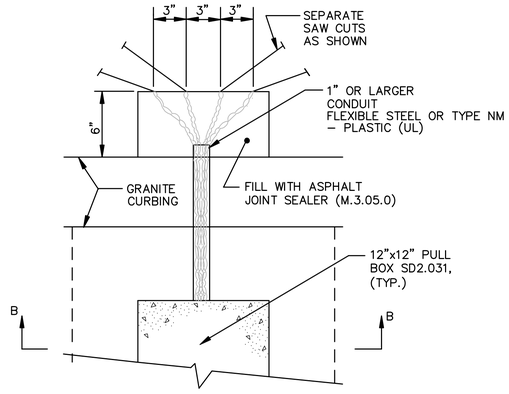
TRAFFIC LEGEND, ABBREVIATIONS & NOTES



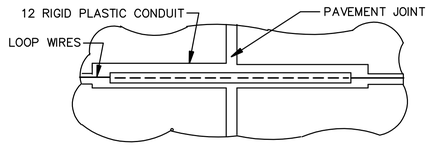
NOTES:
1. NUMBER AND SIZE OF SEGMENTS AND LENGTH OF DETECTION AREA VARIES. SEE TRAFFIC CONTROL AND CONSTRUCTION PLANS.
2. TYPICAL SHOWN. DIMENSIONS MAY VARY. SEE PLANS FOR VARIATIONS.

✳ OFFSETS FROM CURB TO LOOP AND EDGE OF LANE TO LOOP EQUAL IF NOT SHOWN.

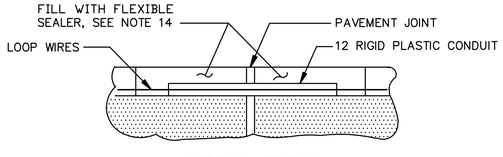
PLAN OF SEGMENTED DETECTOR DETAIL
NOT TO SCALE



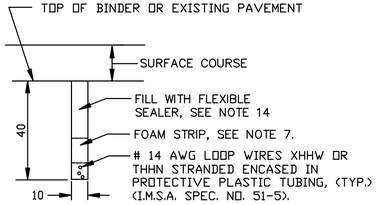
BOX DETAIL – PLAN VIEW
NOT TO SCALE



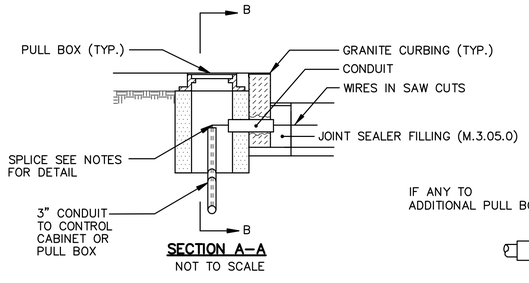
PLAN
TREATMENT AT PAVEMENT JOINTS
NOT TO SCALE



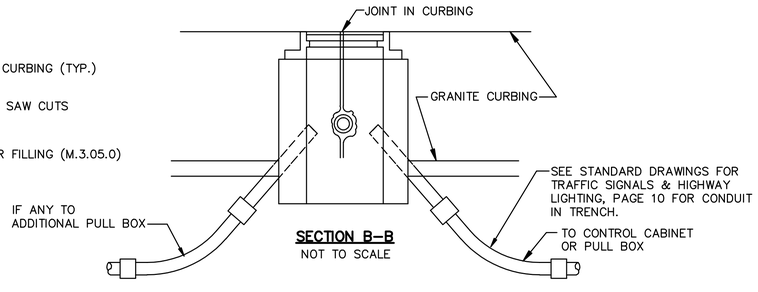
VERTICAL SECTION
TREATMENT AT PAVEMENT JOINTS
NOT TO SCALE



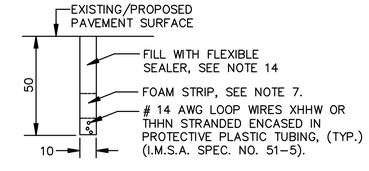
SECTION C–C & D–D
LOOPS IN BINDER COURSE
NOT TO SCALE



SECTION A–A
NOT TO SCALE



SECTION B–B
NOT TO SCALE



SECTION C–C & D–D
LOOPS IN SURFACE COURSE
NOT TO SCALE

IN CHARGE OF GJH
DESIGNED BY TQN
CHECKED BY JWD
DRAWN BY JWD
CHECKED BY JWD

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

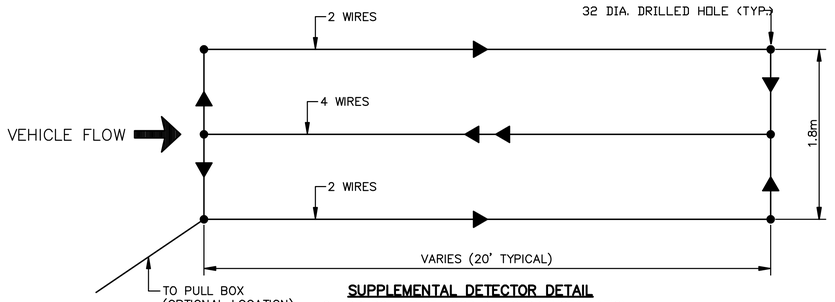
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	48	137
PROJECT FILE NO. 604532				

LOOP DETECTOR DETAILS

DETECTOR NOTES

1. IN PULL BOX, SPLICE ALL SEGMENTS TO TYPE II–SHIELDED LOOP DETECTOR LEAD–IN CABLE I.M.S.A. SPEC. NO. 50–2 (M8. 16. II). SEGMENTS SHALL BE SPLICED IN PARALLEL, IN SERIES, OR IN A COMBINATION OF PARALLEL & SERIES AS SHOWN ON THE PLAN SHEET FOR EACH DETECTOR. NUMBER OF TURNS OF WIRE SHALL ALSO BE AS SHOWN ON THE PLAN SHEET FOR EACH DETECTOR. SEE NOTES 12 & 13 BELOW.
2. SEE SPECIAL PROVISIONS FOR REQUIREMENTS OF DETECTOR AMPLIFIER
3. LEAD IN WIRES SHALL BE TWISTED FROM SEGMENT TO SPLICE WITH SHIELDED CABLE AT FIVE TURNS PER FOOT.
4. BEFORE STARTING ANY SPLICING, THE ELECTRICAL CONTRACTOR SHALL FURNISH DATA SHEETS ON THE MATERIALS AND/OR METHODS TO BE USED IN ACCORDANCE WITH THE DEPARTMENT'S STANDARD OPERATING PROCEDURES FOR APPROVAL OF SHOP DRAWINGS SEE SECTION 815.64, ESPECIALLY PARAGRAPH 1.
5. THE METALLIC SHIELD WHICH SHALL ENCASE THE DETECTOR LEADS FROM A SPLICE (TYPICALLY LOCATED IN A PULL BOX NEAR THE ROADWAY COMPONENT OF THE DETECTOR) TO THE CONTROLLER,AND THE DRAIN WIRE UNDER THE METALLIC SHIELD, SHALL NOT BE GROUNDED TO THE EARTH GROUNDING BUSS IN THE CONTROLLER, AND THE SHIELD AND DRAIN WIRE SHALL BE CAREFULLY INSULATED FROM THE TRANSFORMER NEUTRAL OR FROM EARTH GROUND AT ALL POINTS ALONG ITS LENGTH. SPECIFICALLY, THIS INCLUDES CAREFUL INSULATION OF THE EXPOSED PORTION OF THE SHIELD AND THE DRAIN WIRE AT THE END AWAY FROM THE CONTROLLER WHERE IT IS SPLICED TO WIRES LEADING TO THE ROADWAY COMPONENT OF THE DETECTOR. THIS IS IMPORTANT TO AVOID A GROUND RETURN LOOP.
6. FILL ALL CONDUIT OPENINGS WITH DUCT SEAL.
7. AFTER SAW CUTS ARE COMPLETE, BLOW OUT WATER WITH OIL–FREE COMPRESSED AIR UNTIL CUTS ARE CLEAN AND DRY. INSERT WIRE INTO CLEAN SLOT WITH A BLUNT, SMOOTH, ROUND EDGED TOOL OF WOOD OR PLASTIC SUCH AS A PAINT STIRRER. DO NOT USE A SCREWDRIVER. THEN INSERT FOAM PLASTIC HOLD–DOWN STRIPS, SIMILAR TO ETHA FOAM SB. STRIPS SHALL BE ABOUT 2" LONG, PLACED IN THE SLOT ABOUT EVERY 2'. THEN POUR SEALER, TAKING CARE TO ELIMINATE BUBBLES. DO NOT ALLOW OVERFLOW TO REMAIN ON TOP COURSE OF PAVEMENT.
8. THE COMBINED ROADWAY LOOP, TWISTED LEAD–IN WIRES, SPLICE AND SHIELDED LEAD–IN CABLE SHALL HAVE A RESISTANCE TO GROUND OF AT LEAST 100 MEGOHMS. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
9. FOR INSTALLATION OF SINGLE (ONE SEGMENT) SMALL WIRE LOOP DETECTOR, DETAIL IS THE SAME
10. CUT LOOPS IN SURFACE COURSE IN ALL CASES UNLESS ROADWAY OWNER REQUIRES OTHERSWISE.
11. DETECTOR WIRE SHALL BE A DIFFERENT COLOR FOR EACH SEGMENT OF A DETECTOR GROUP. SEE DETAIL
12. SPLICING PATTERN S/P = SERIES/PARALLEL: SPLICE SEGMENTS 1 AND 3 OF AN INDIVIDUAL DETECTOR IN SERIES. SPLICE SEGMENTS 2 AND 4 IN SERIES. SPLICE THE RESULTANT TWO GROUPS IN PARALLEL. SPLICE THE RESULTANT COMBINATION TO ONE LEAD–IN CABLE. CONNECT THIS CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL.
13. SPLICING PATTERN S = SERIES: SPLICE ALL SEGMENTS (TYPICALLY FOUR, BUT MAY BE LESS) OF AN INDIVIDUAL DETECTOR IN SERIES. SPLICE THE RESULTANT COMBINATION TO ONE LEAD–IN CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL. P = PARALLEL: SPLICE ALL SEGMENTS OF AN INDIVIDUAL DETECTOR IN PARALLEL. SPLICE THE RESULTANT COMBINATION TO ONE LEAD–IN CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL.
14. FOR THIS PROJECT, USE POLYETHYLENE SEALER. DO NOT USE EPOXY PRODUCTS.
15. ALL DIMENSIONS ARE IN INCHES UNLESS SHOWN OTHERWISE.

REVISED 12/20/1994



SUPPLEMENTAL DETECTOR DETAIL
QUADRUPOLE TYPE LOOP DETECTOR INSTALLATION
NOT TO SCALE

THIS DETAIL IS INTENDED TO SHOW THE LOOP DETECTOR CONFIGURATION ONLY. REFER TO THE STANDARD LOOP DETECTOR DETAILS (SHOWN ON THIS SHEET) FOR OTHER DETAILS SUCH AS PULL BOXES, SAW CUTTING, ETC.

THE TYPICAL QUADRUPOLE TYPE LOOP DETECTOR INSTALLATION CONSISTS OF ONE OR MORE 6' x 20' RECTANGULAR LOOP(S) WITH A CENTER CUT WHICH HAS TWICE THE WINDINGS AS THE PERIMETER CUTS. FOR A 6m LONG INSTALLATION, THE WIRES WILL CONSIST OF A "2–4–2" CONFIGURATION INDICATING 2 PERIMETER WIRES AND 4 CENTER WIRES. FOR A 6' x 40' OR 6' x 50' LOOP, THE NUMBER OF WINDINGS AND CONFIGURATION WILL BE "1–2–1".

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	49	137
PROJECT FILE NO. 604532				

TRAFFIC SIGNAL PLAN

TRAFFIC CONTROLLER DATA	
PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2 & ø6) (ø4 & ø8)
SIMULTANEOUS GAP OUT DISABLED	YES
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED

PREFERENTIAL PHASE SEQUENCE

FULLY–ACTUATED ☑ ISOLATED ☑
SEMI–ACTUATED ☐ COORDINATED ☐
PRE–TIMED ☐ WIRE ☐ TBCU ☐

SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	FLASH OPER.
ACTON ROAD (ROUTE 27)	NB	A,B	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
ACTON ROAD (ROUTE 27)	SB	C,D,E	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY
CARLISLE ROAD (ROUTE 225)	EB	F,G	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
CARLISLE ROAD (ROUTE 225)	WB	H,J	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR
PEDESTRIAN		P1–P2	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
TIMING IN SECONDS																		
MINIMUM INITIAL			6			6			6			6						EMERGENCY
PASSAGE			2			2			2			2						
MAXIMUM 1			–			–			–			–						
MAXIMUM 2			–			–			–			–						
CHANGE				4	1		4	1		4	1		4	1				
PEDESTRIAN															7	15	1	
RECALL			SOFT			OFF			SOFT			OFF			OFF			
MEMORY			NON–LOCKING			NON–LOCKING			NON–LOCKING			NON–LOCKING			LOCKING			

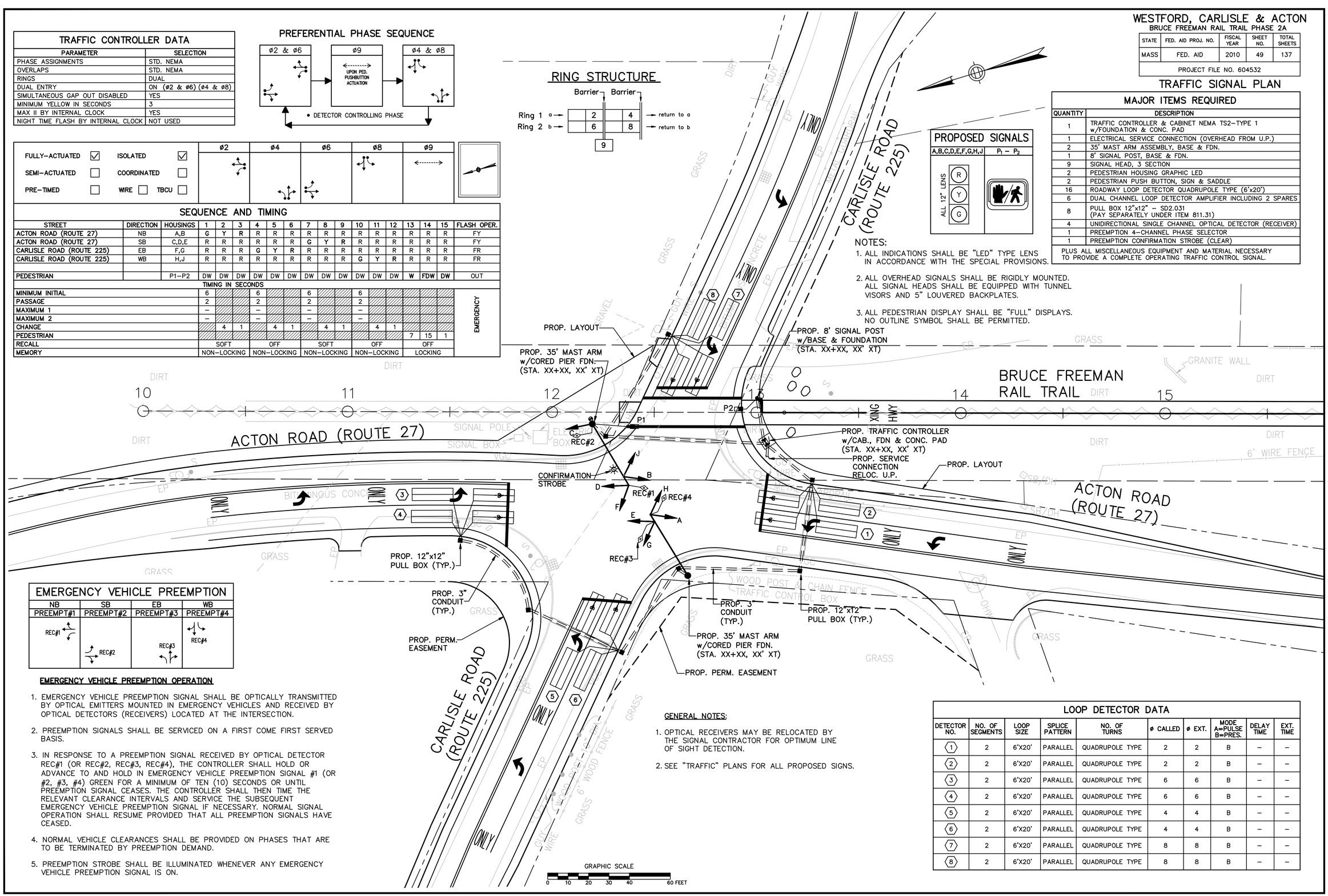
RING STRUCTURE

PROPOSED SIGNALS

MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	TRAFFIC CONTROLLER & CABINET NEMA TS2–TYPE 1 w/FOUNDATION & CONC. PAD
1	ELECTRICAL SERVICE CONNECTION (OVERHEAD FROM U.P.)
2	35' MAST ARM ASSEMBLY, BASE & FDN.
1	8' SIGNAL POST, BASE & FDN.
9	SIGNAL HEAD, 3 SECTION
2	PEDESTRIAN HOUSING GRAPHIC LED
2	PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
16	ROADWAY LOOP DETECTOR QUADRUPOLE TYPE (6'x20')
6	DUAL CHANNEL LOOP DETECTOR AMPLIFIER INCLUDING 2 SPARES
8	PULL BOX 12"x12" – SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)
4	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL DETECTOR (RECEIVER)
1	PREEMPTION 4–CHANNEL PHASE SELECTOR
1	PREEMPTION CONFIRMATION STROBE (CLEAR)
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

NOTES:
1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL OVERHEAD SIGNALS SHALL BE RIGIDLY MOUNTED. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS AND 5" LOUVERED BACKPLATES.
3. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.



EMERGENCY VEHICLE PREEMPTION

NB	SB	EB	WB
PREEMPT#1	PREEMPT#2	PREEMPT#3	PREEMPT#4
REC#1	REC#2	REC#3	REC#4

EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3, REC#4), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

GENERAL NOTES:
1. OPTICAL RECEIVERS MAY BE RELOCATED BY THE SIGNAL CONTRACTOR FOR OPTIMUM LINE OF SIGHT DETECTION.
2. SEE "TRAFFIC" PLANS FOR ALL PROPOSED SIGNS.

LOOP DETECTOR DATA

DETECTOR NO.	NO. OF SEGMENTS	LOOP SIZE	SPLICE PATTERN	NO. OF TURNS	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
⟨1⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	2	2	B	–	–
⟨2⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	2	2	B	–	–
⟨3⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	6	6	B	–	–
⟨4⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	6	6	B	–	–
⟨5⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	4	4	B	–	–
⟨6⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	4	4	B	–	–
⟨7⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	8	8	B	–	–
⟨8⟩	2	6'X20'	PARALLEL	QUADRUPOLE TYPE	8	8	B	–	–

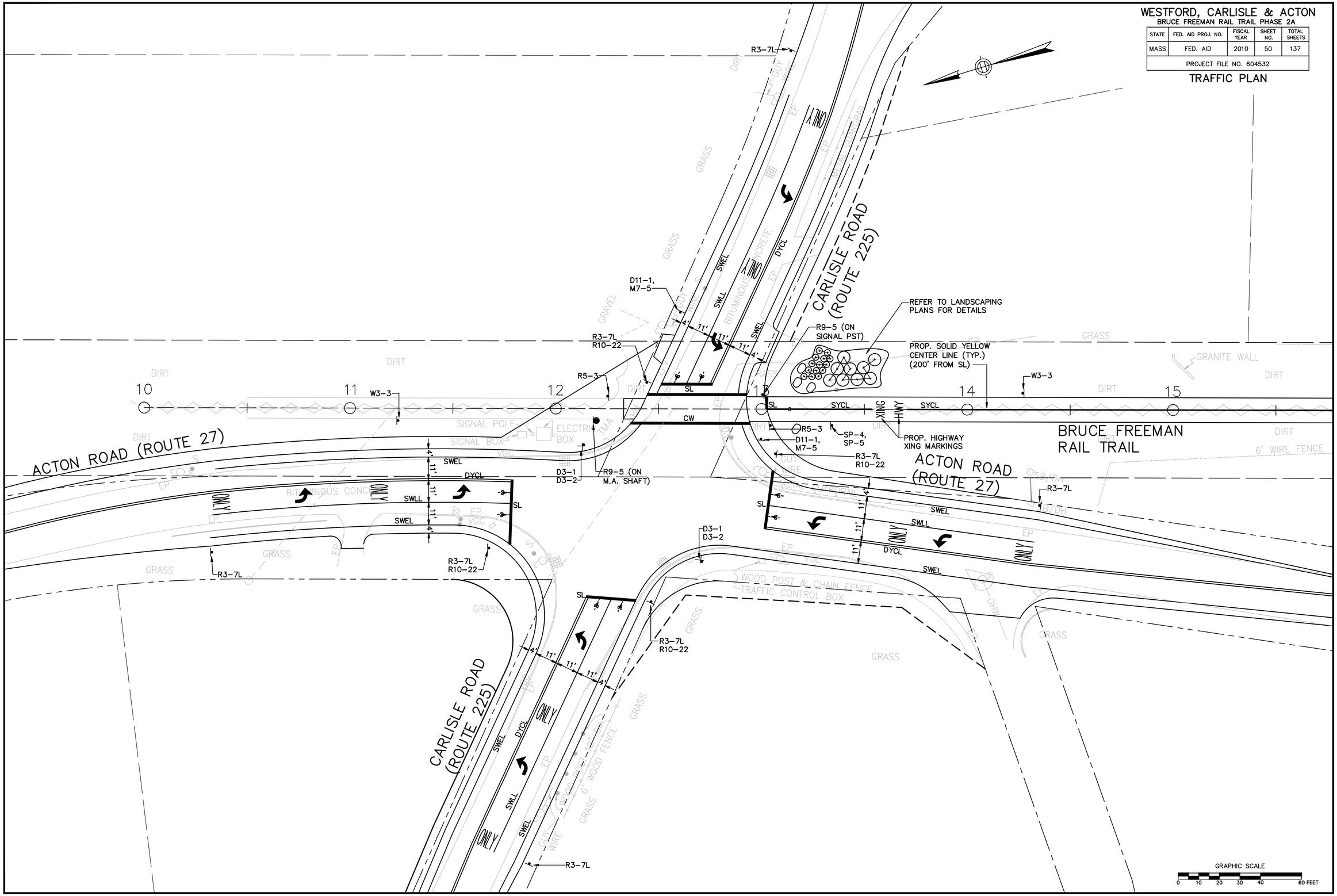
IN CHARGE OF	GJH
DESIGNED BY	TQN
CHECKED BY	JWD
DRAWN BY	TQN
CHECKED BY	JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	50	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN



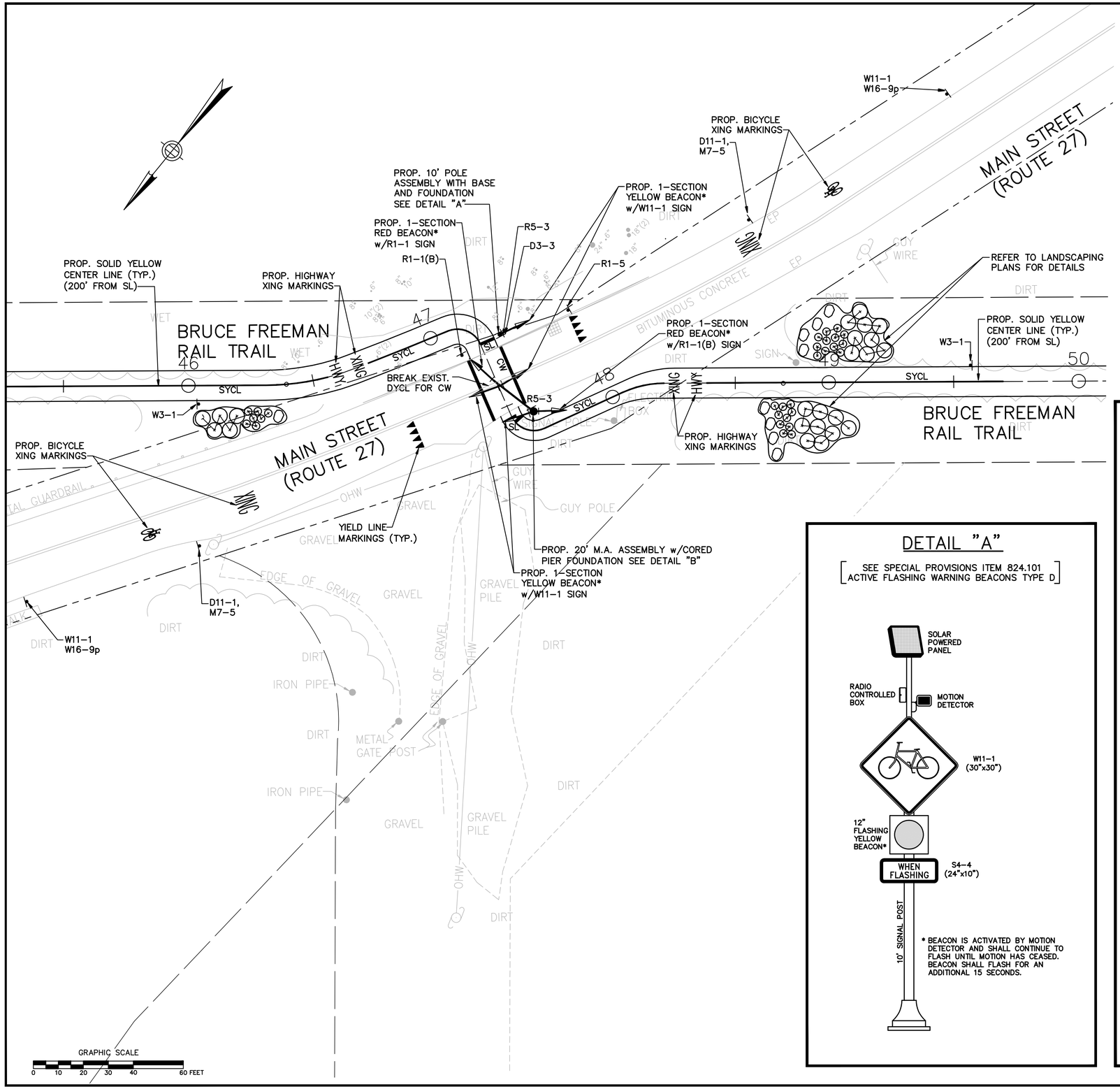
IN CHARGE OF GJH
DESIGNED BY TQN
CHECKED BY JWD
DRAWN BY TQN
CHECKED BY JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	51	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN

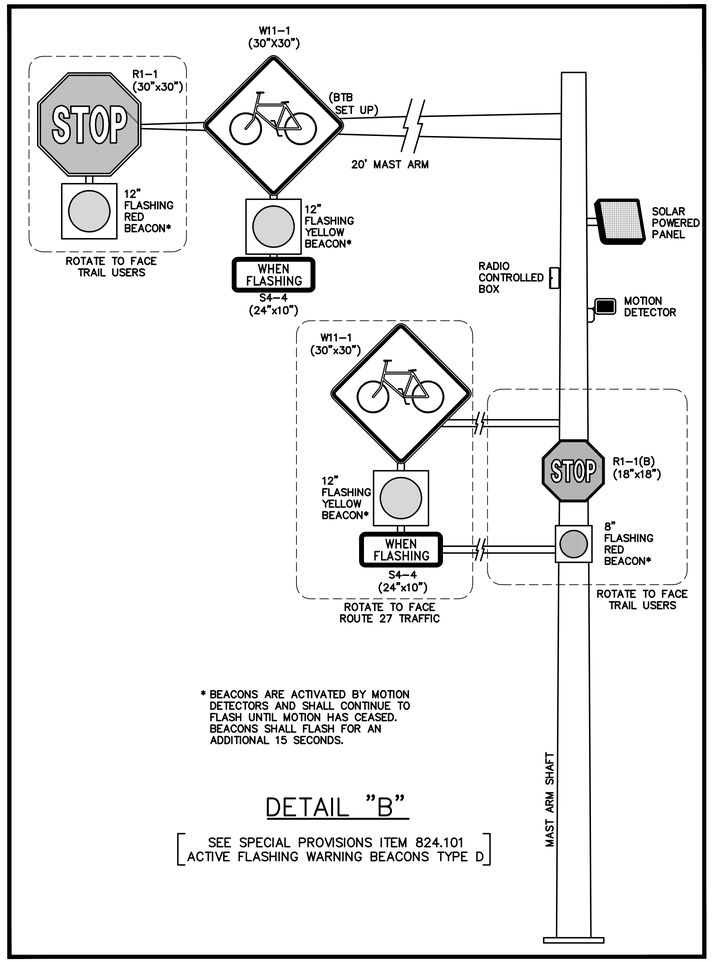


MAJOR ITEMS REQUIRED – ITEM 824.101	
QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	MOTION SENSOR DETECTOR
1	10' SIGNAL POST, BASE & FDN.
1	20' MAST ARM ASSEMBLY, BASE & FDN.
1	SIGNAL HEAD, 1 SECTION, 8" RED LED
1	SIGNAL HEAD, 1 SECTION, 12" RED LED
4	SIGNAL HEAD, 1 SECTION, 12" YELLOW LED
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

DETAIL "A"

[SEE SPECIAL PROVISIONS ITEM 824.101
ACTIVE FLASHING WARNING BEACONS TYPE D]

* BEACON IS ACTIVATED BY MOTION DETECTOR AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACON SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.



* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACONS SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

DETAIL "B"

[SEE SPECIAL PROVISIONS ITEM 824.101
ACTIVE FLASHING WARNING BEACONS TYPE D]

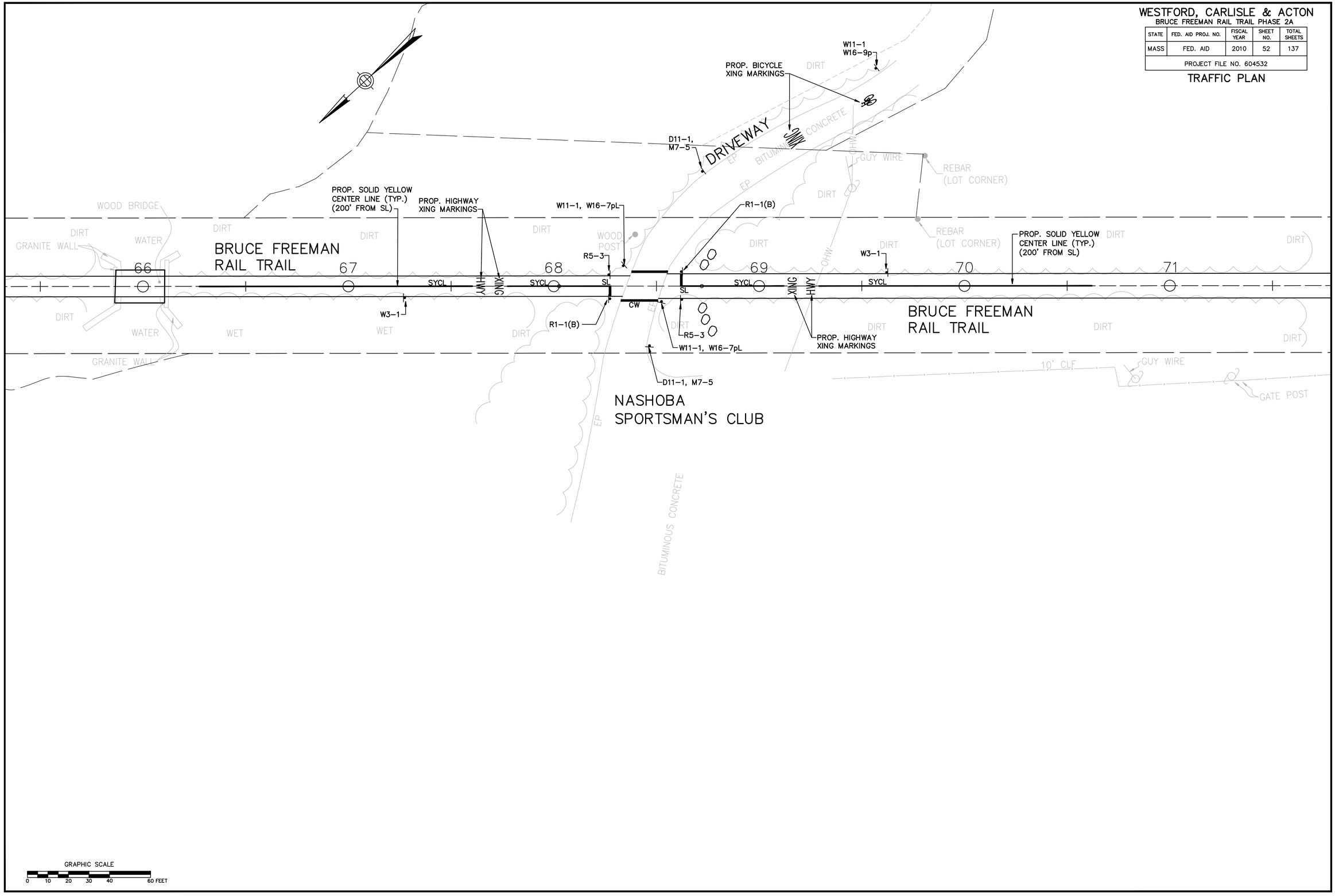
IN CHARGE OF	GJH
DESIGNED BY	TGN
CHECKED BY	JWD
DRAWN BY	TGN
CHECKED BY	JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	52	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN



IN CHARGE OF GJH
DESIGNED BY TQN
CHECKED BY JWD
DRAWN BY TQN
CHECKED BY JWD

GRAPHIC SCALE
0 10 20 30 40 60 FEET

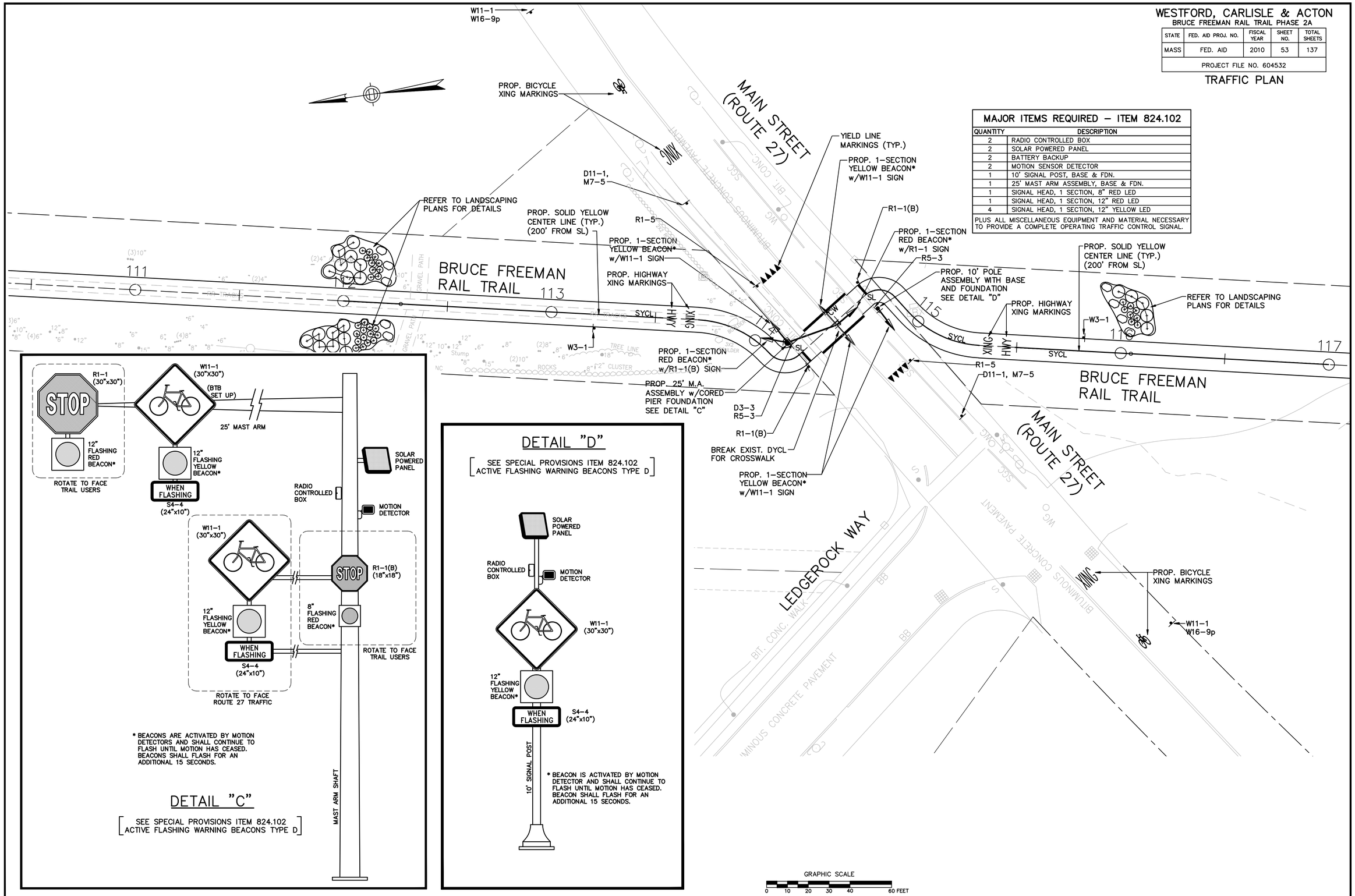
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	53	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN

MAJOR ITEMS REQUIRED – ITEM 824.102	
QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	MOTION SENSOR DETECTOR
1	10' SIGNAL POST, BASE & FDN.
1	25' MAST ARM ASSEMBLY, BASE & FDN.
1	SIGNAL HEAD, 1 SECTION, 8" RED LED
1	SIGNAL HEAD, 1 SECTION, 12" RED LED
4	SIGNAL HEAD, 1 SECTION, 12" YELLOW LED
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	



* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACONS SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

DETAIL "C"

[SEE SPECIAL PROVISIONS ITEM 824.102 ACTIVE FLASHING WARNING BEACONS TYPE D]

DETAIL "D"

[SEE SPECIAL PROVISIONS ITEM 824.102 ACTIVE FLASHING WARNING BEACONS TYPE D]

* BEACON IS ACTIVATED BY MOTION DETECTOR AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACON SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

GRAPHIC SCALE
0 10 20 30 40 60 FEET

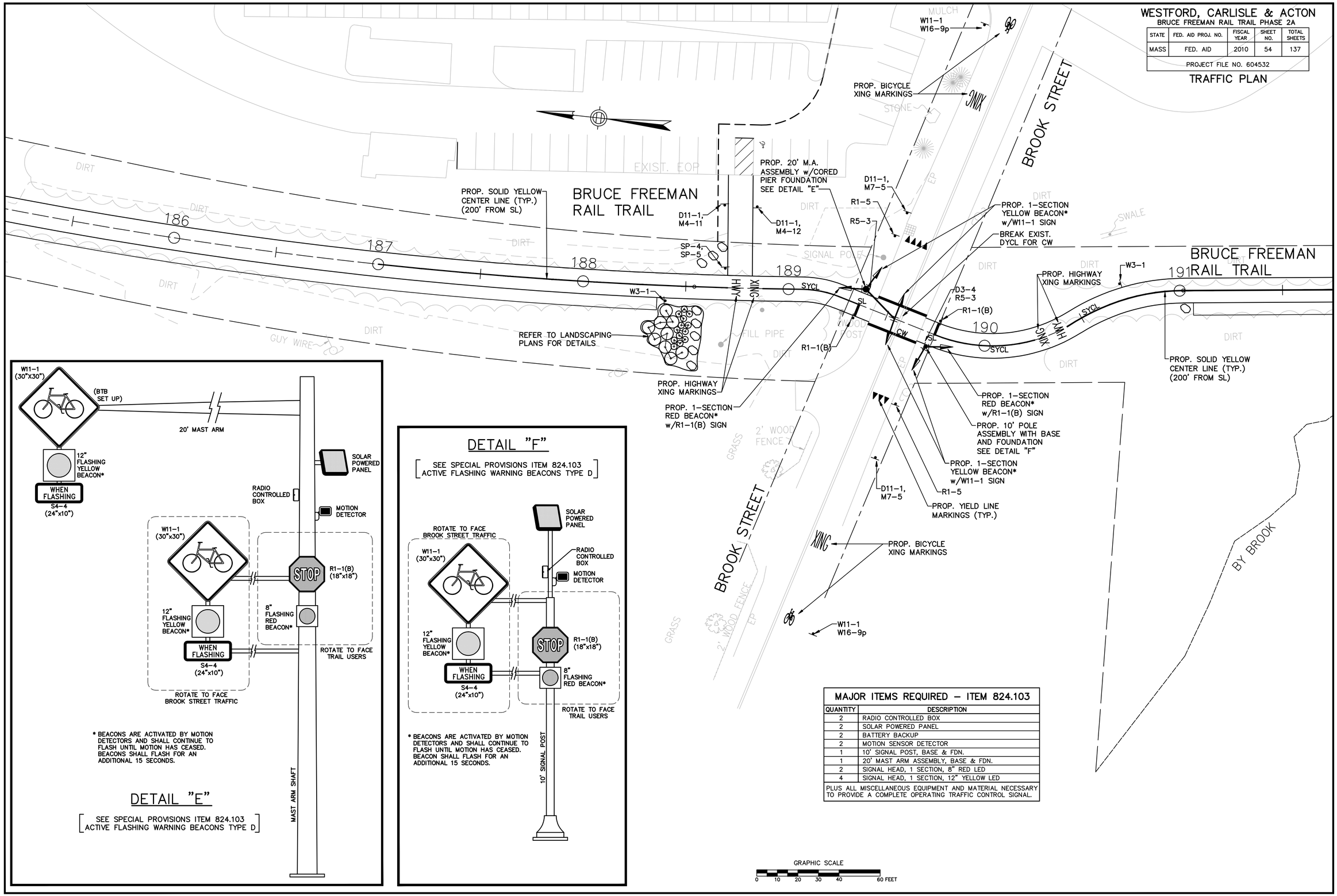
IN CHARGE OF	GJH
DESIGNED BY	TON
CHECKED BY	JWD
DRAWN BY	TON
CHECKED BY	JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	54	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN



* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACONS SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

DETAIL "E"

[SEE SPECIAL PROVISIONS ITEM 824.103 ACTIVE FLASHING WARNING BEACONS TYPE D]

* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACON SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

DETAIL "F"

[SEE SPECIAL PROVISIONS ITEM 824.103 ACTIVE FLASHING WARNING BEACONS TYPE D]

MAJOR ITEMS REQUIRED – ITEM 824.103

QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	MOTION SENSOR DETECTOR
1	10' SIGNAL POST, BASE & FDN.
1	20' MAST ARM ASSEMBLY, BASE & FDN.
2	SIGNAL HEAD, 1 SECTION, 8" RED LED
4	SIGNAL HEAD, 1 SECTION, 12" YELLOW LED
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

GRAPHIC SCALE

0 10 20 30 40 60 FEET

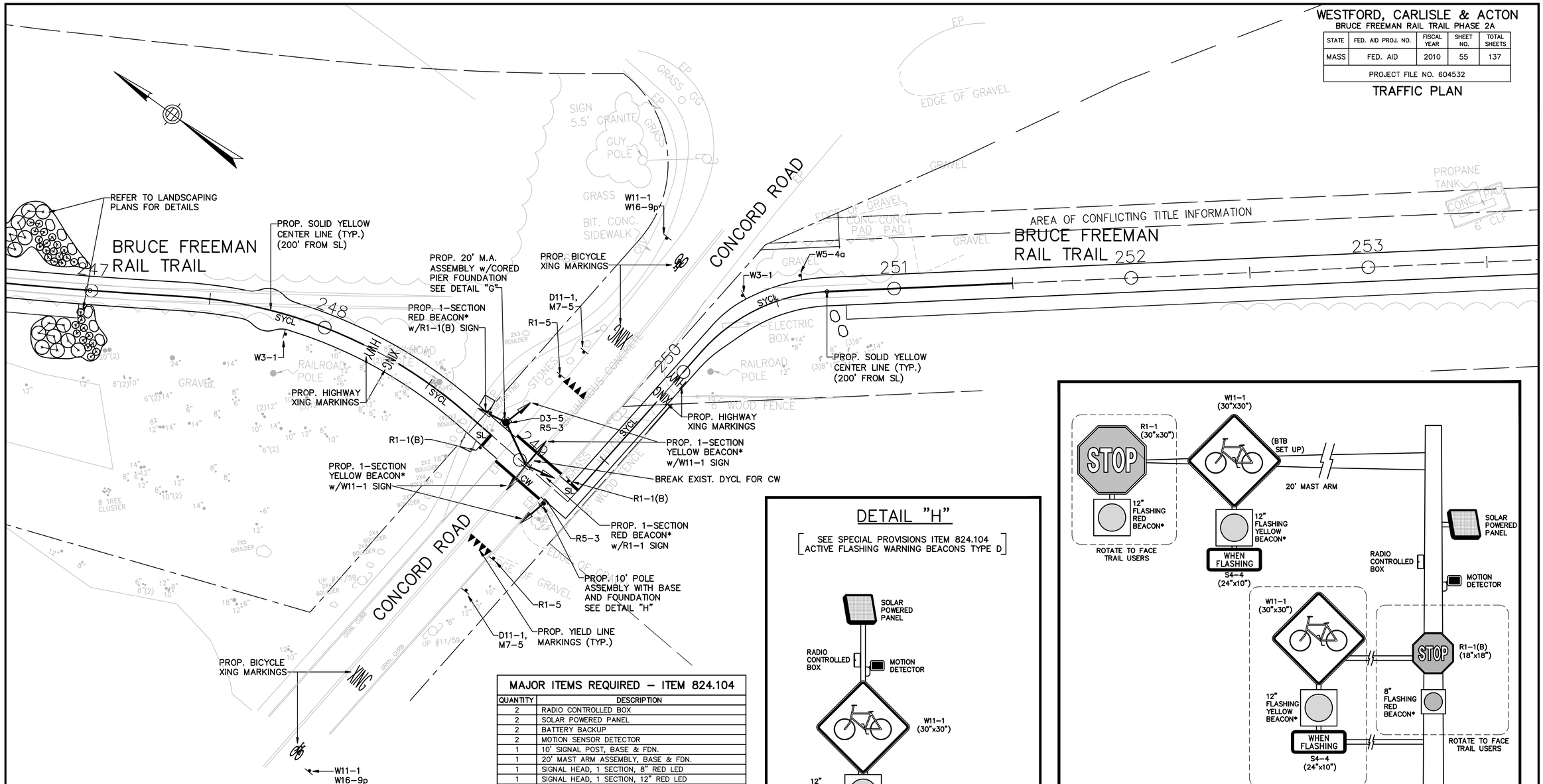
IN CHARGE OF	GJH
DESIGNED BY	TON
CHECKED BY	JWD
DRAWN BY	TON
CHECKED BY	JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	55	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN

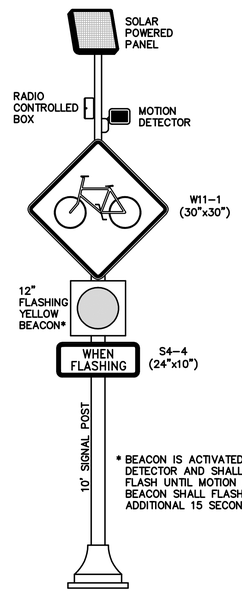


MAJOR ITEMS REQUIRED – ITEM 824.104

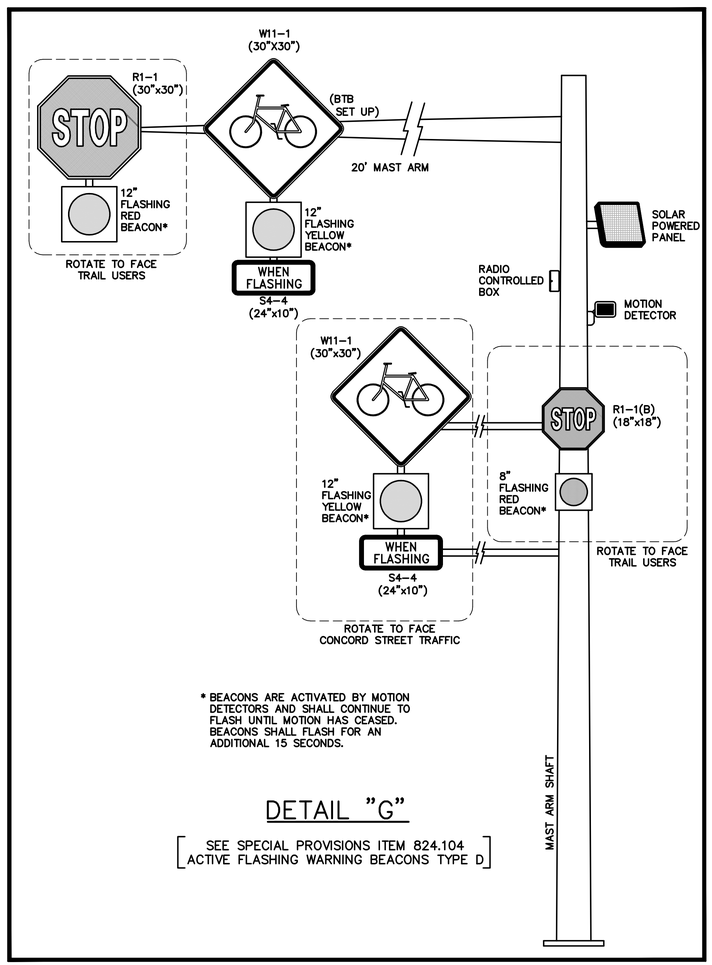
QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	MOTION SENSOR DETECTOR
1	10' SIGNAL POST, BASE & FDN.
1	20' MAST ARM ASSEMBLY, BASE & FDN.
1	SIGNAL HEAD, 1 SECTION, 8" RED LED
1	SIGNAL HEAD, 1 SECTION, 12" RED LED
4	SIGNAL HEAD, 1 SECTION, 12" YELLOW LED
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	

DETAIL "H"

[SEE SPECIAL PROVISIONS ITEM 824.104
ACTIVE FLASHING WARNING BEACONS TYPE D]



* BEACON IS ACTIVATED BY MOTION DETECTOR AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACON SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.



* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACONS SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

DETAIL "G"

[SEE SPECIAL PROVISIONS ITEM 824.104
ACTIVE FLASHING WARNING BEACONS TYPE D]

GRAPHIC SCALE

0 10 20 30 40 60 FEET

IN CHARGE OF	GJH
DESIGNED BY	TQN
CHECKED BY	JWD
DRAWN BY	TQN
CHECKED BY	JWD

WESTFORD, CARLISLE & ACTON

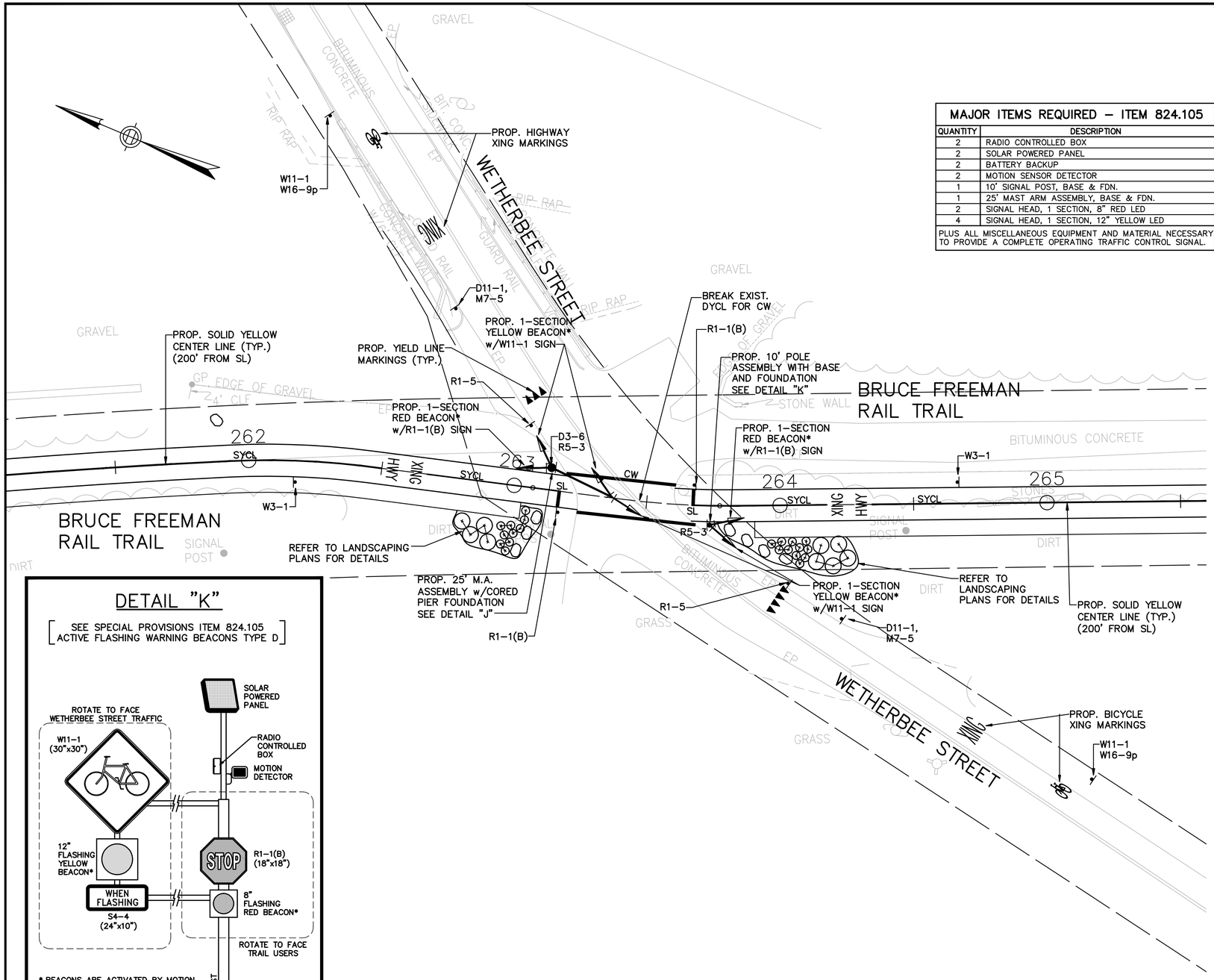
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	56	137
PROJECT FILE NO. 604532				

TRAFFIC PLAN

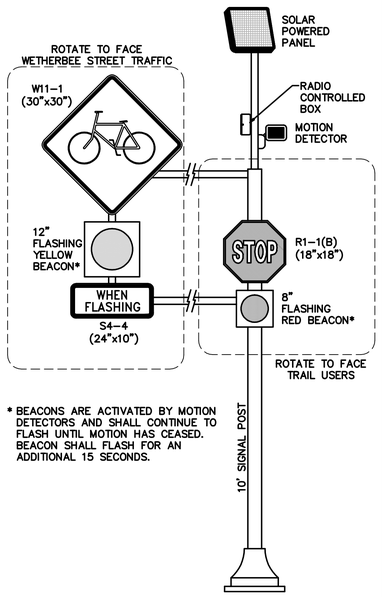
MAJOR ITEMS REQUIRED – ITEM 824.105

QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	MOTION SENSOR DETECTOR
1	10' SIGNAL POST, BASE & FDN.
1	25' MAST ARM ASSEMBLY, BASE & FDN.
2	SIGNAL HEAD, 1 SECTION, 8" RED LED
4	SIGNAL HEAD, 1 SECTION, 12" YELLOW LED
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.	



DETAIL "K"

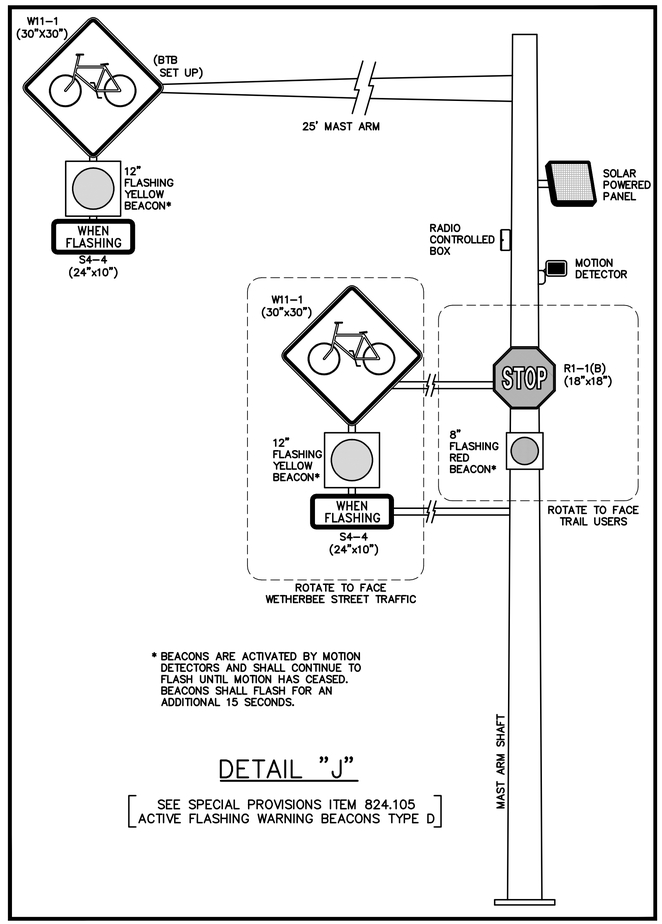
[SEE SPECIAL PROVISIONS ITEM 824.105 ACTIVE FLASHING WARNING BEACONS TYPE D]



* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACON SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

GRAPHIC SCALE

0 10 20 30 40 60 FEET



* BEACONS ARE ACTIVATED BY MOTION DETECTORS AND SHALL CONTINUE TO FLASH UNTIL MOTION HAS CEASED. BEACONS SHALL FLASH FOR AN ADDITIONAL 15 SECONDS.

DETAIL "J"

[SEE SPECIAL PROVISIONS ITEM 824.105 ACTIVE FLASHING WARNING BEACONS TYPE D]

IN CHARGE OF	GJH
DESIGNED BY	TON
CHECKED BY	JWD
DRAWN BY	TON
CHECKED BY	JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	57	137
PROJECT FILE NO. 604532				

TRAFFIC SIGN SUMMARY

IDENTIFICATION NUMBER	SIZE OF SIGN WIDTH	SIZE OF SIGN HEIGHT	TEXT	TEXT DIMENSIONS (INCHES) LETTER HEIGHT	TEXT DIMENSIONS (INCHES) VERTICAL SPACING	NUMBER OF SIGNS REQUIRED	COLOR BACKGROUND	COLOR LEGEND	COLOR BORDER	POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
R1-1	30"	30"	STOP	MUTCD STANDARD		4	MUTCD STANDARD			3 MNT ON M.A. 1 MNT ON P5	6.25	25.00
R1-1(B)	18"	18"	STOP			18				12 ON P5; 5 ON MA SHAFT; 2 ON SIGNAL POST	2.25	40.50
R1-5	18"	18"				9				P5 (9 REQ'D)	2.25	20.25
R3-7L	30"	30"	LEFT LANE MUST TURN LEFT			8				P5 (8 REQ'D)	6.25	50.00
R5-3	24"	24"	NO MOTOR VEHICLES			15*				6 ON P5; 4 ON MA SHAFT; 5 ON SIGNAL POST	4.00	60.00
R7-8	12"	18"	RESERVED PARKING			3				P5 (3 REQ'D)	1.50	4.50
R7-8A	18"	9"	VAN ACCESSIBLE			3				MNT w/R7-8	1.125	3.375
R9-5	12"	18"	USE PED SIGNAL			2				1 MNT ON M.A. SHAFT; 1 MNT ON SIGNAL POST	1.50	3.00
R10-22	18"	24"	TO REQUEST GREEN WAIT ON	MHD STANDARD		4	MHD STANDARD			MNT w/R3-7L	3.00	12.00
W1-1L	18"	18"		MUTCD STANDARD		3*	MUTCD STANDARD			P5 (3 REQ'D)	2.25	6.75
W1-1R	18"	18"				3*				P5 (3 REQ'D)	2.25	6.75
W1-2L	18"	18"				1*				P5 (1 REQ'D)	2.25	2.25
W1-2R	18"	18"				1*				P5 (1 REQ'D)	2.25	2.25
W1-5R	18"	18"				1*				P5 (1 REQ'D)	2.25	2.25
W3-1	18"	18"				12				P5 (12 REQ'D)	2.25	27.00
W3-3	18"	18"				2				P5 (2 REQ'D)	2.25	4.50
W5-4a	18"	18"	BIKEWAY NARROWS			1				P5 (1 REQ'D)	2.25	2.25
W11-1	30"	30"				31				10 ON MAST ARM; 11 ON P5; 5 ON MA SHAFT; 5 ON SIGNAL POST	6.25	193.75
W16-7pL	24''	12''				2				MNT w/W11-1	2.00	4.00
W16-9p	24"	12"	AHEAD			9				MNT w/W11-1 ON P5	2.00	18.00
S4-4	24"	12"	WHEN FLASHING			20				10 ON M.A.; 5 ON MA SHAFT; 5 ON SIGNAL POST	2.00	40.00
SP-1	24"	12"	PRIVATE PROPERTY	3"C 3"C	2" 2" 2"	2*	WHITE	RED	RED	P5 (2 REQ'D)	2.00	4.00
SP-2	24"	18"	PARKING FOR TRAIL USE ⇐	2"C 2"C USE ARROW ON MUTCD R7-1	3" 3" 3" 3"	4*	WHITE	RED	RED	P5 (4 REQ'D)	3.00	12.00
SP-3	24"	18"	PARKING FOR TRAIL USE ⇒	2"C 2"C USE ARROW ON MUTCD R7-2	3" 3" 3" 3"	4*	WHITE	RED	RED	P5 (4 REQ'D)	3.00	12.00
SP-4	30"	24"	BRUCE FREEMAN RAIL TRAIL	4"B 4"B 4"B	3" 3" 3" 3"	5*	BROWN	WHITE	WHITE	P5 (5 REQ'D)	5.00	25.00
SP-5	24"	36"	TRAIL RULES SIGN (REF. SPEC. 832.11)			5*	WHITE	BLACK	BLACK	MNT w/SP-4	PAY UNDER ITEM 832.11	
D3-1	VAR.	12"	ACTON RD	6"C/4"C	3" 3"	2	MUTCD STANDARD			P5 (2 REQ'D)	PAY UNDER ITEM 874.	
D3-2	VAR.	12"	CARLISLE RD	6"C/4"C	3" 3"	2				MNT w/D3-1	PAY UNDER ITEM 874.	
D3-3	VAR.	12"	MAIN ST	6"C/4"C	3" 3"	2				1 MNT ON M.A. SHAFT; 1 MNT ON SIGNAL POST	PAY UNDER ITEM 874.	
D3-4	VAR.	12"	BROOK ST	6"C/4"C	3" 3"	1				1 MNT ON SIGNAL POST	PAY UNDER ITEM 874.	
D3-5	VAR.	12"	CONCORD RD	6"C/4"C	3" 3"	1				1 MNT ON M.A. SHAFT	PAY UNDER ITEM 874.	
D3-6	VAR.	12"	WETHERBEE ST	6"C/4"C	3" 3"	1				1 MNT ON M.A. SHAFT	PAY UNDER ITEM 874.	
D11-1	24"	18"	BIKE ROUTE	MUTCD STANDARD		20*	MUTCD STANDARD			P5 (20 REQ'D)	3.00	60.00
M4-11	24"	6"	BEGIN			4*				MNT w/D11-1	1.00	4.00
M4-12	24"	6"	END			4*				MNT w/D11-1	1.00	4.00
M7-1	12"	9"	⇒			2				MNT w/D11-1	0.75	1.50
M7-5	12"	9"	⇔			10				MNT w/D11-1	0.75	7.50

NOTES:

1. ALL WARNING, REGULATORY AND ROUTE MARKERS SHALL BE FABRICATED WITH HIGH INTENSITY ENCAPSULATED LENS REFLECTIVE SHEETING (SEE SECTION M9.30.0) TYPE III OR IV.
2. ALL SIGNS NOTED AS "(R&R)" SHALL BE MOUNTED ON NEW P5 POSTS OR AS OTHERWISE INDICATED.
3. ALL P5 POSTS SHALL BE TELESCOPIC BREAKAWAY SQUARE TUBE POSTS.
4. QUANTITIES OF SIGNS AND POSTS SHOWN ON THIS SHEET MAY DIFFER FROM THE PAVEMENT MARKING AND SIGNING PLANS. WHERE DIFFERENCES OCCUR, THE PAVEMENT MARKINGS AND SIGNING PLANS SHALL PREVAIL.
5. ALL STOP AND YIELD SIGNS PROPOSED IN THIS CONTRACT ARE SUBJECT TO FIELD INVESTIGATION BY THE DISTRICT OFFICE OF THE MASSACHUSETTS HIGHWAY DEPARTMENT TO JUSTIFY WARRANTS BEFORE INSTALLATION.

* NOT ALL OF THESE SIGNS ARE SHOWN ON THE TRAFFIC PLANS. PLEASE REFER TO THE CONSTRUCTION PLANS AS WELL FOR PROPOSED LOCATIONS.

IN CHARGE OF GJH
DESIGNED BY TQN
CHECKED BY JWD
DRAWN BY TQN
CHECKED BY JWD

TRAFFIC MANAGEMENT NOTES

GENERAL

1. ALL TRAFFIC MANAGEMENT AND WORK ZONE TRAFFIC CONTROL MEASURES SHALL CONFORM TO THE 2003 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) FOR STREETS AND HIGHWAYS, THE STANDARD SPECIFICATIONS AND THE FOLLOWING NOTES.

2. THE TRAFFIC MANAGEMENT PLANS CONTAINED HEREIN ARE GIVEN AS A GUIDE FOR TYPICAL WORK ZONE TRAFFIC CONTROL APPLICATIONS FOR THE TYPES OF WORK ANTICIPATED FOR THIS PROJECT. THEY ARE NOT INTENDED TO COVER ALL POSSIBLE CONSTRUCTION OPERATIONS WHICH THE CONTRACTOR MAY CHOOSE TO EMPLOY. WORK ZONE TRAFFIC CONTROL FOR OTHER CONSTRUCTION OPERATIONS OR OTHER TRAFFIC SITUATIONS IF APPLICABLE SHALL BE IN ACCORDANCE WITH THE M.U.T.C.D. AND AS APPROVED OR DIRECTED BY THE ENGINEER.

3. LANE RESTRICTIONS MAY NOT REMAIN OVERNIGHT OR DURING NON-WORKING HOURS. AFTER EACH WORKING DAY, TRAFFIC CONTROL DEVICES THAT ARE NOT REQUIRED SHALL BE MOVED OFF THE ROADWAY OR FULL DEPTH CONSTRUCTION AREA AND PLACED SO AS NOT TO IMPEDE PEDESTRIAN AREAS, ABUTTER ACCESS OR CAUSE CONFUSION TO MOTORISTS.

4. CONTRACTOR SHALL PROVIDE A SAFE TEMPORARY PEDESTRIAN AND/OR BICYCLIST ACCESS WHERE EXISTING SIDEWALKS OR OTHER PEDESTRIAN AND/OR BICYCLIST AREAS ARE AFFECTED BY CONSTRUCTION WORK. CONTRACTOR SHALL MAINTAIN ABUTTER ACCESS AT ALL TIMES EXCEPT FOR SHORT PERIODS APPROVED BY THE ENGINEER.

5. CONTRACTOR SHALL PLACE ALL CONSTRUCTION SIGNING, TRAFFIC CONTROL DEVICES AND TEMPORARY PAVEMENT MARKINGS FOR EACH PHASE PRIOR TO COMMENCEMENT OF CONSTRUCTION.

6. ONE (1) THRU TRAVEL LANE HAVING A MINIMUM WIDTH OF 11'-0" SHALL BE PROVIDED FOR BOTH DIRECTIONS (LANE TO BE SHARED AND DIRECTION OF TRAVEL TO ALTERNATE UNDER POLICE OFFICER CONTROL) DURING ALL PHASES OF CONSTRUCTION AS SHOWN ON THE TRAFFIC MANAGEMENT PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

7. WHEN WORK INFRINGES UPON THE TRAVELED WAY, WORK SHALL BE RESTRICTED TO OFF-PEAK HOURS ONLY (NORMALLY 9:00am TO 3:00 pm, MONDAY TO FRIDAY).

8. TAPER LENGTH FORMULAE FOR CHANNELIZATION DEVICES:
   L = SxW FOR SPEED EQUAL TO OR GREATER THAN 45 M.P.H.
   L = WS²/60 FOR SPEED EQUAL TO OR LESS THAN 40 M.P.H.
   WHERE: L = MIN. LENGTH OF TAPER, S = POSTED SPEED, W = OFFSET WIDTH.

9. ADVISORY SPEED LIMIT SHALL BE SET IN THE FIELD BY THE ENGINEER. W13-1 PLATES SHALL BE USED WHERE APPROPRIATE.

10. FLASHING ARROW PANEL SHALL BE SET IN "CAUTION MODE" WHEN USED FOR ACTUAL LANE CLOSURES.

11. DISTANCES SHOWN ON THE TRAFFIC MANAGEMENT PLANS ARE A GUIDE ONLY, AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER IN ACCORDANCE WITH THE MUTCD 2003 STANDARD.

GRADE DIFFERENCES

12. WHERE THERE IS A LONGITUDINAL DIFFERENCE IN ELEVATION BETWEEN EXISTING PAVEMENT AND COLD PLANED OR NEW PAVEMENT, THE CONTRACTOR SHALL PATCH A TEMPORARY HOT MIX ASPHALT WEDGE WITH A 12:1 (OR FLATTER) SLOPE FOR SMOOTH TRANSITION. SEE DETAIL, THIS SHEET.

13. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF REFLECTORIZED DRUMS.

14. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 4" DURING NON-WORKING HOURS SHALL BE PROTECTED BY BACKFILLING WITH A WEDGE OF EARTHWORK TO BE COMPACTED AT 4:1 SLOPE AND WILL ALSO REQUIRE DELINEATION BY USE OF DRUMS.

15. A MINIMUM SLOPE OF 4:1 MUST BE MAINTAINED AFTER WORKING HOURS DURING SUBBASE AND BASE COURSE INSTALLATION ALONG EDGE OF THE TRAVELWAY (SEE DETAIL, THIS SHEET). A MINIMUM SLOPE OF 8:1 MUST BE MAINTAINED ON ALL ABUTTER ACCESS DRIVES AND A MINIMUM SLOPE OF 12:1 MUST BE MAINTAINED ON ALL SIDEWALKS.

CONSTRUCTION SIGNING

16. THE FIRST CONSTRUCTION SIGN IN A SERIES ON EACH APPROACH TO THE PROJECT SHALL BE FLUORESCENT ORANGE, HIGH PERFORMANCE (OR HIGH INTENSITY) SHEETING.

17. ALL CONSTRUCTION SIGNS SHALL BE BLACK LEGEND ON A REFLECTORIZED ORANGE BACKGROUND UNLESS OTHERWISE NOTED. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY MUST MEET THE CRITERIA SET FORTH IN THE NCHRP 350 REPORT. SIGNS ARE NOT TO BE MOUNTED ON PLASTIC DRUMS.

18. EXISTING GUIDE SIGNS SHALL BE TEMPORARILY RESET AS DIRECTED BY THE ENGINEER.

19. ALL SIGNS, INCLUDING EXISTING, THAT ARE NOT REPRESENTATIVE OF ACTUAL WORK CONDITIONS SHALL BE EITHER COVERED OR REMOVED WHEN NOT APPLICABLE.

20. IF USED, ALL W20-4 AND W20-5 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY.

21. USE W20-8 SIGNS ONLY WHILE POLICE ARE DIRECTING TRAFFIC. THEY SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY.

22. SIGNS MUST BE PROFESSIONALLY LETTERED. NO HANDWRITTEN/PAINTED SIGNS SHALL BE ALLOWED.

PAVEMENT MARKINGS

23. PAVEMENT MARKINGS THAT ARE NO LONGER APPLICABLE SHALL BE REMOVED. APPLY TEMPORARY MARKINGS WHERE SHOWN ON THE TRAFFIC MANAGEMENT PLANS OR AS DIRECTED BY THE ENGINEER.

24. ON PROJECTS WHERE PAVEMENT OVERLAY IS NOT DESIGNATED, EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH TEMPORARY TRAFFIC CONTROLS SHOULD BE COVERED TEMPORARILY WITH BLACKOUT PAINT OR TAPE, AS DIRECTED BY THE ENGINEER, FOR THE FULL DURATION OF THE PHASE IN PROGRESS. TEMPORARY PAINTED OR REMOVABLE TAPE MARKINGS SHALL BE USED AS NECESSARY FOR ALL PHASES OF CONSTRUCTION.

CHANNELIZATION

25. THE MAXIMUM SPACING BETWEEN CHANNELIZATION DEVICES (DRUMS OR CONES) SHALL BE APPROXIMATELY EQUAL IN FEET TO THE POSTED SPEED LIMIT. THE MINIMUM SPACING SHALL BE 20' O.C.

26. REFLECTORIZED CONES SHALL BE MINIMUM 28" HIGH, 36" CONES ARE RECOMMENDED.

27. FLASHING OR STEADY BURN WARNING LIGHTS SHALL ALSO BE USED ON BARRICADES, JERSEY BARRIERS OR WHERE DIRECTED BY THE ENGINEER.

28. METAL DRUMS ARE PROHIBITED FROM USE ON ALL STATE HIGHWAY PROJECTS.

29. PLASTIC DRUMS WITH SOME FORM OF LIGHTING DEVICE MOUNTED ON THEM MUST PASS THE CRITERIA SET FORTH IN NCHRP 350 "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES." IF THEY DO NOT MEET THESE CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.

30. TEMPORARY IMPACT ATTENUATORS MUST MEET THE PERFORMANCE STANDARDS OF NCHRP 350.

31. SIGNS AND SIGN SUPPORT LOCATED ON OR NEAR THE TRAVELED WAY MUST PASS THE CRITERIA SET FORTH IN NCHRP 350 "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES." IF THEY DO NOT MEET THIS CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.

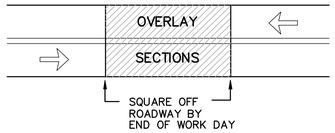
TRAFFIC MANAGEMENT LEGEND

- WORK AREA
- DIRECTION OF TRAVEL
- REFLECTORIZED DRUM (OR CONE)
- A — REFLECTORIZED DRUM WITH TYPE 'A' FLASHING WARNING LIGHT
- POLICE OFFICER CONTROL
- PORTABLE TYPE III BARRICADE (4' WIDE, MIN.)
- REMOVABLE JERSEY BARRIER
- FLASHING ARROW BOARD (30"x 60" STD. SIZE WITH 13 LAMPS, MIN.)

GUIDELINE FOR LENGTH OF BUFFER SPACE

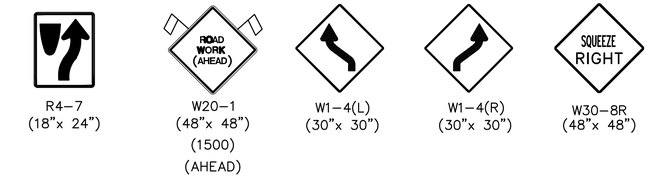
SPEED* (MPH)	LENGTH (FEET)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495

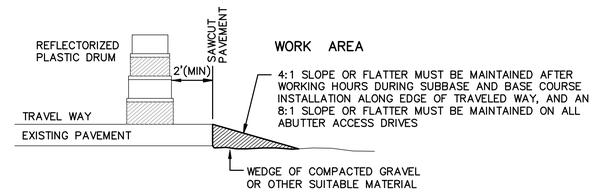
* POSTED SPEED, OFF-PEAK 85th PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.



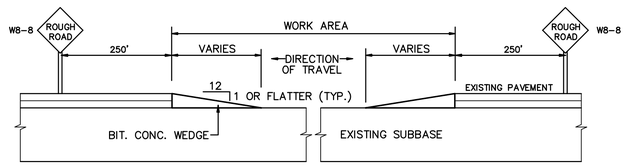
AFTER WORK HOURS TREATMENT FOR AREAS RECEIVING OVERLAY

SIGN LEGEND

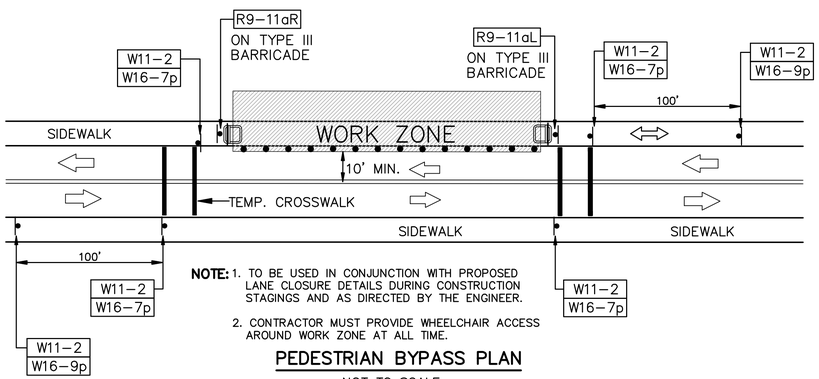




AFTER WORK HOURS TREATMENT FOR LATERAL SLOPING



TEMPORARY RAMP



NOTE: 1. TO BE USED IN CONJUNCTION WITH PROPOSED LANE CLOSURE DETAILS DURING CONSTRUCTION STAGINGS AND AS DIRECTED BY THE ENGINEER.

2. CONTRACTOR MUST PROVIDE WHEELCHAIR ACCESS AROUND WORK ZONE AT ALL TIME.

PEDESTRIAN BYPASS PLAN

NOT TO SCALE

IN CHARGE OF GJH
DESIGNED BY JPJ
CHECKED BY JWD
DRAWN BY JPJ
CHECKED BY JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

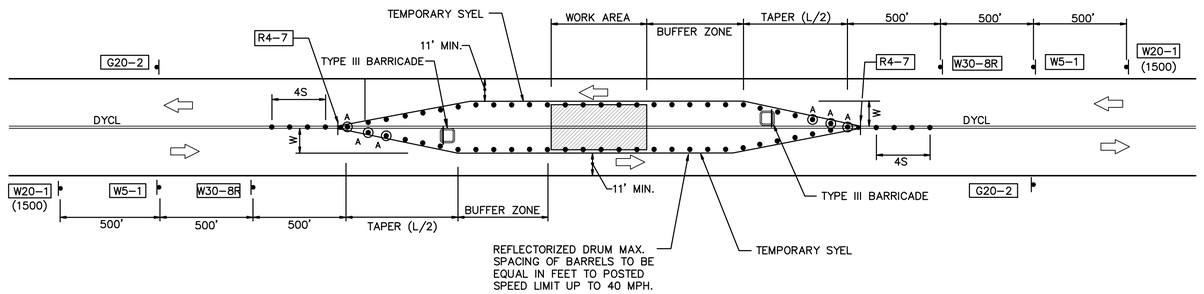
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	58	137
PROJECT FILE NO. 604532				

TRAFFIC MANAGEMENT PLAN

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

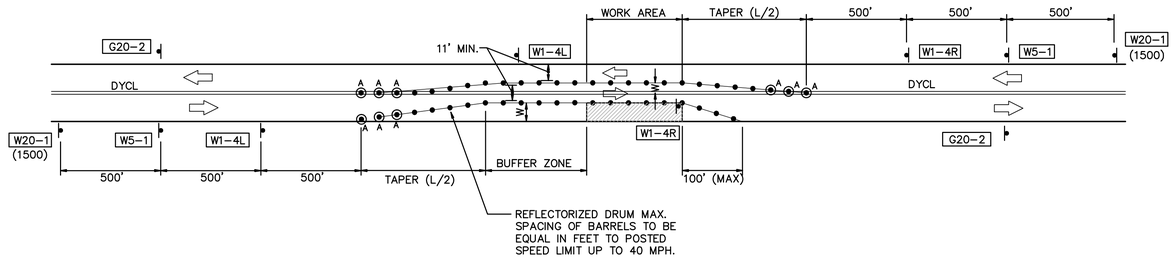
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	59	137
PROJECT FILE NO. 604532				

TRAFFIC MANAGEMENT PLAN



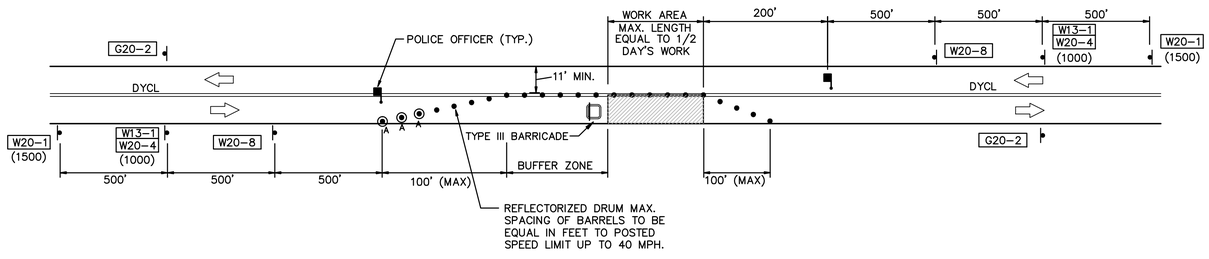
CENTER ROADWAY CLOSURE

TWO LANE ROADWAY WITH CENTER OF ROAD CLOSED
NOT TO SCALE



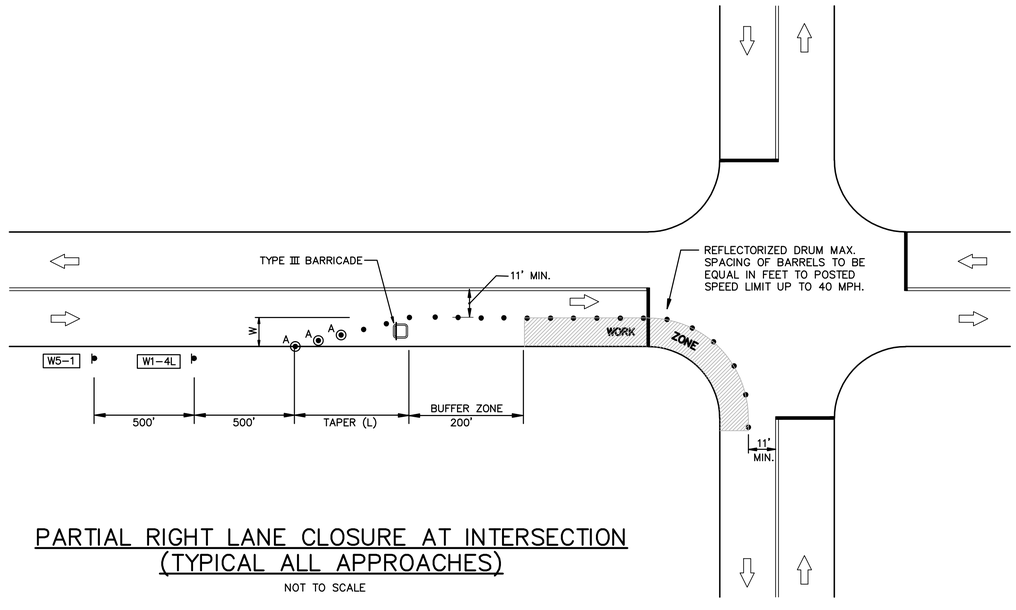
PARTIAL RIGHT LANE CLOSURE

TWO LANE ROADWAY WITH PARTIAL LANE CLOSURE
NOT TO SCALE



HALF ROADWAY CLOSURE

TWO LANE ROADWAY
(RIGHT SIDE WORK ZONE – MIRROR IMAGE FOR LEFT SIDE WORK ZONE)
NOT TO SCALE



PARTIAL RIGHT LANE CLOSURE AT INTERSECTION (TYPICAL ALL APPROACHES)

NOT TO SCALE

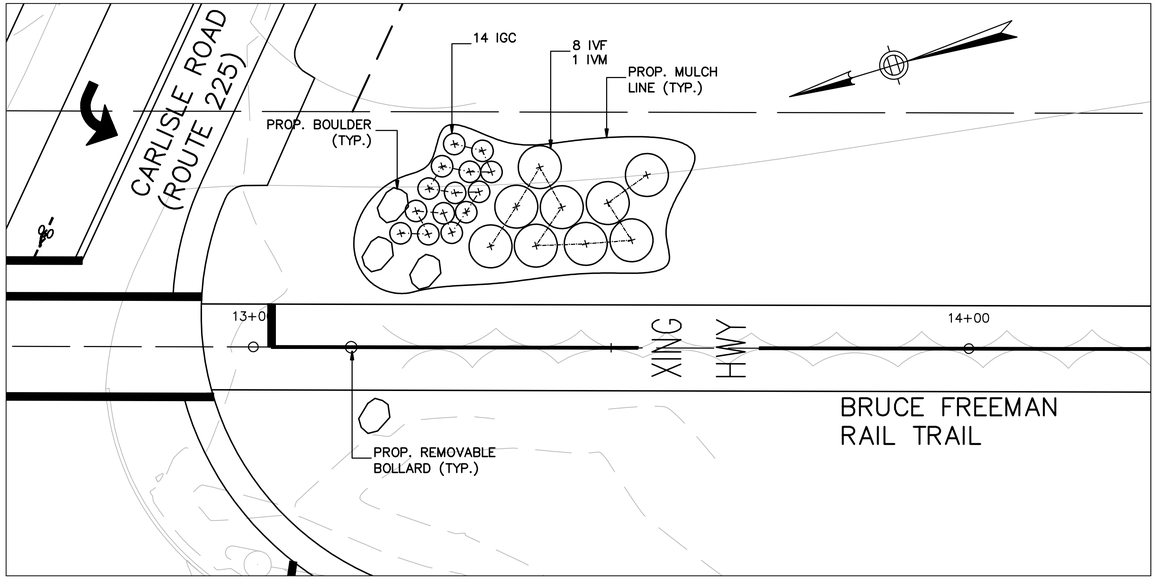
IN CHARGE OF GJH
DESIGNED BY JPJ
CHECKED BY JWD
DRAWN BY JPJ
CHECKED BY JWD

WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	60	137
PROJECT FILE NO. 604532				

LANDSCAPING PLAN

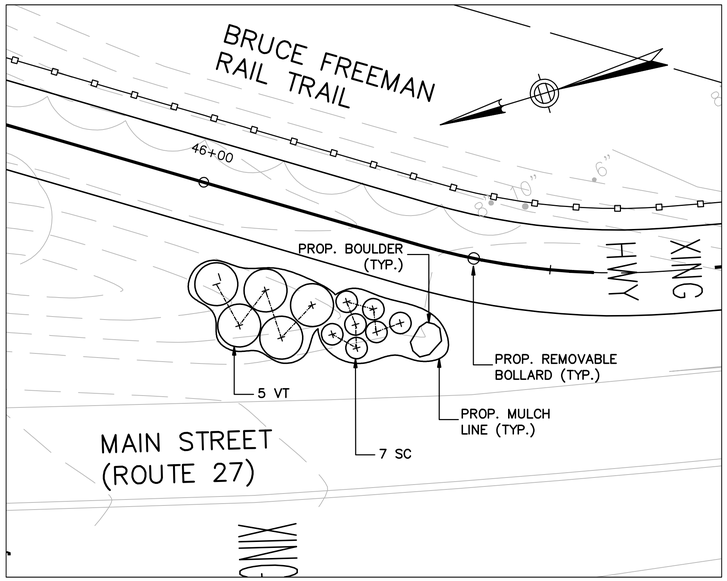


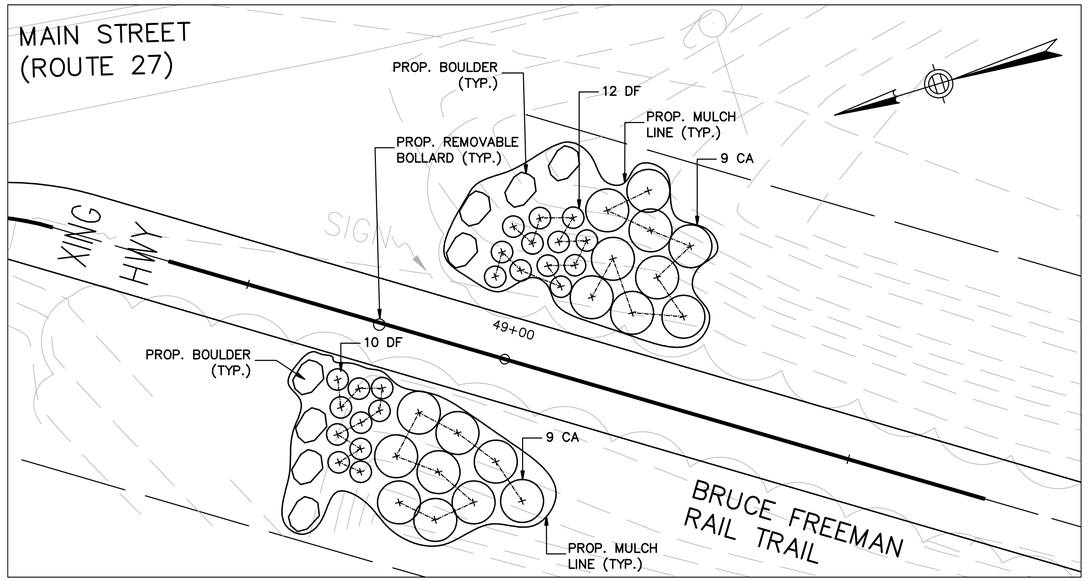
PLANT LIST

SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	5	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	2 – 3 FEET
CA	18	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 – 3 FEET
IVM	1	ILEX VERTICILLATA	WINTERBERRY – MALE	24 – 30 INCH
IVF	8	ILEX VERTICILLATA	WINTERBERRY – FEMALE	24 – 30 INCH
IGC	14	ILEX GLABRA 'COMPACTA'	INKBERRY – COMPACT	24 – 30 INCH
SC	7	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB – CHENAULT	2 – 3 FEET
DF	22	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18 – 24 INCH

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.

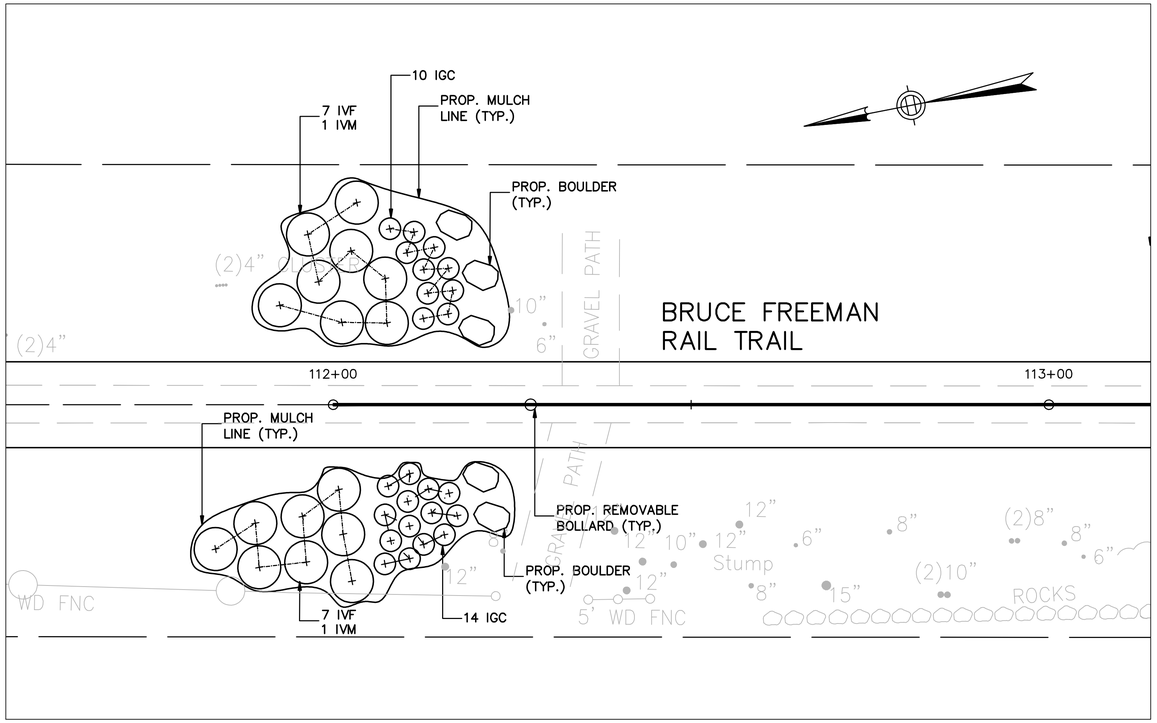


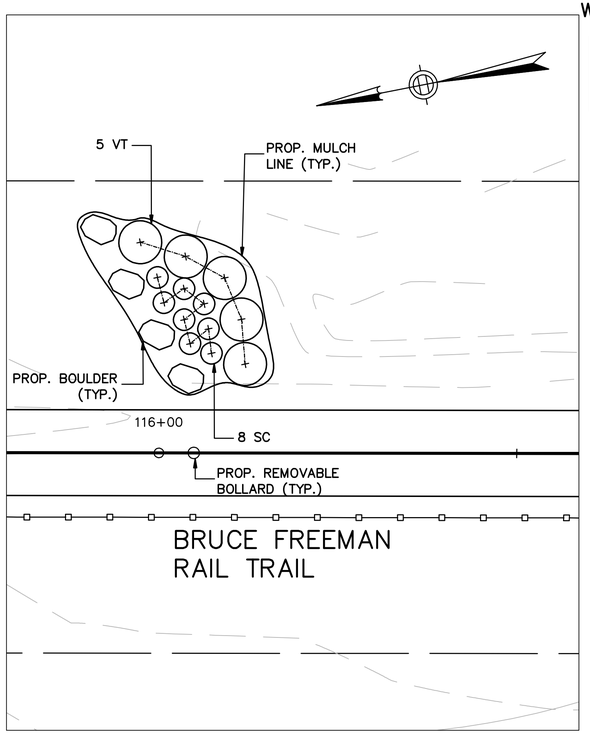


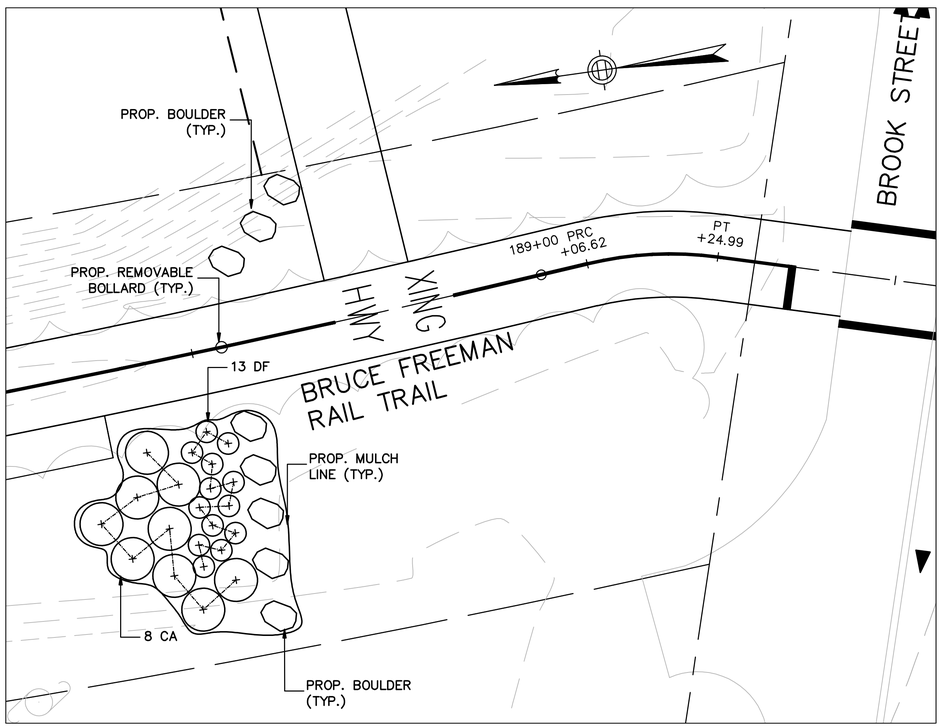
GRAPHIC SCALE

0 5 10 15 20 30 FEET

IN CHARGE OF	GJH
DESIGNED BY	MDE
CHECKED BY	GJH
DRAWN BY	MDE
CHECKED BY	GJH







PLANT LIST				
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	5	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	2 – 3 FEET
CA	8	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 – 3 FEET
IVM	2	ILEX VERTICILLATA	WINTERBERRY – MALE	24 – 30 INCH
IVF	14	ILEX VERTICILLATA	WINTERBERRY – FEMALE	24 – 30 INCH
IGC	24	ILEX GLABRA 'COMPACTA'	INKBERRY – COMPACT	24 – 30 INCH
SC	8	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB – CHENAULT	2 – 3 FEET
DF	13	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18 – 24 INCH

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.

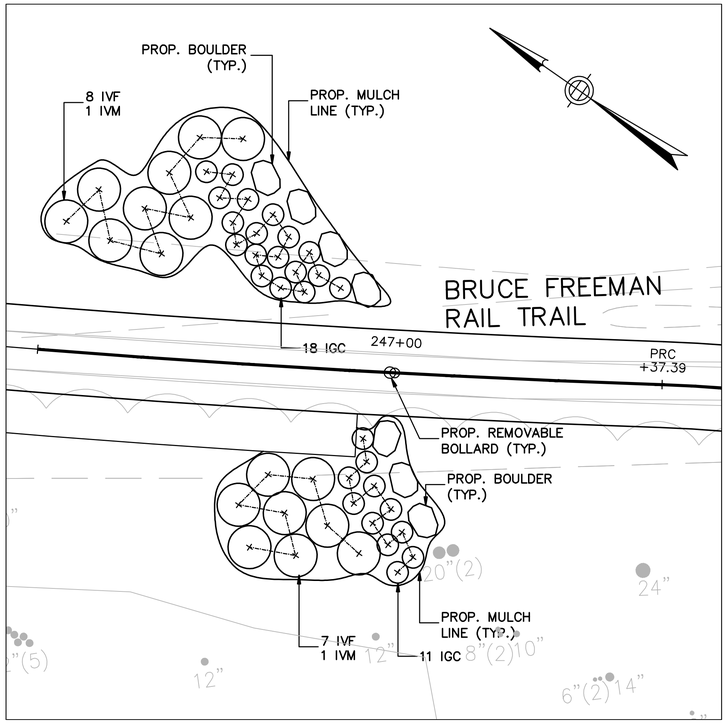
GRAPHIC SCALE
0 5 10 15 20 30 FEET

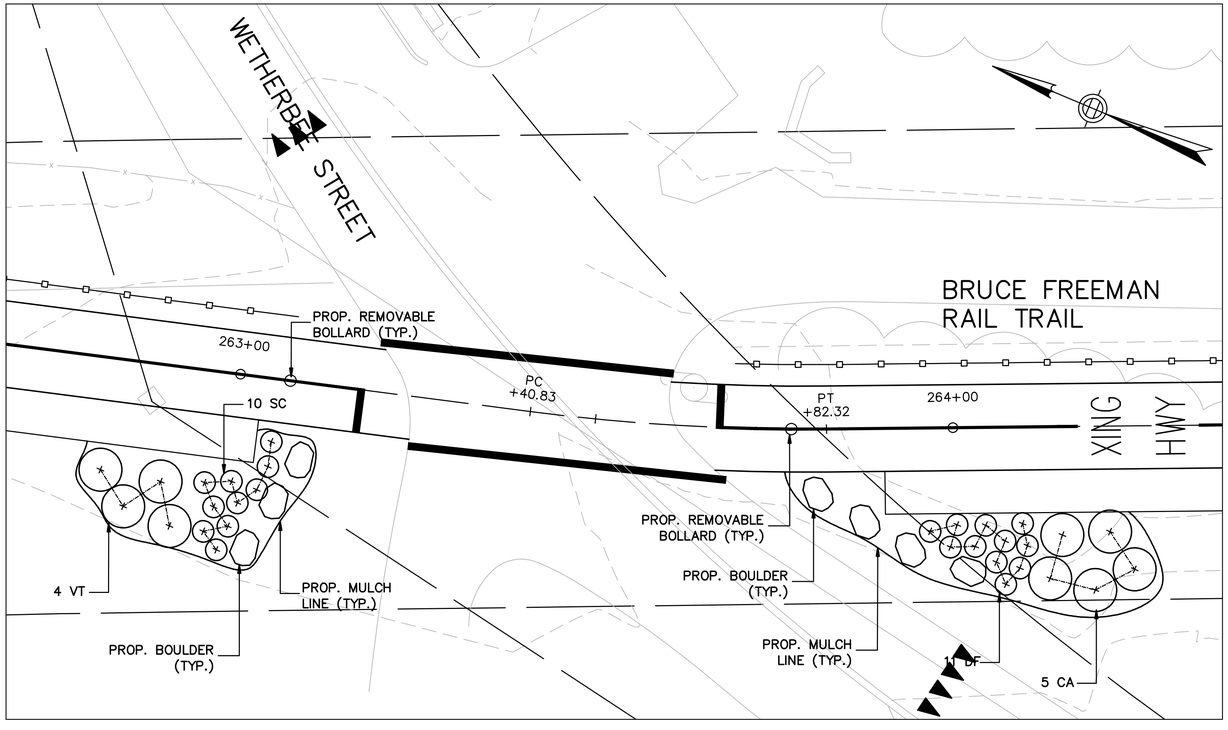
IN CHARGE OF GJH
DESIGNED BY MDE
CHECKED BY GJH
DRAWN BY MDE
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	61	137
PROJECT FILE NO. 604532				

LANDSCAPING PLAN

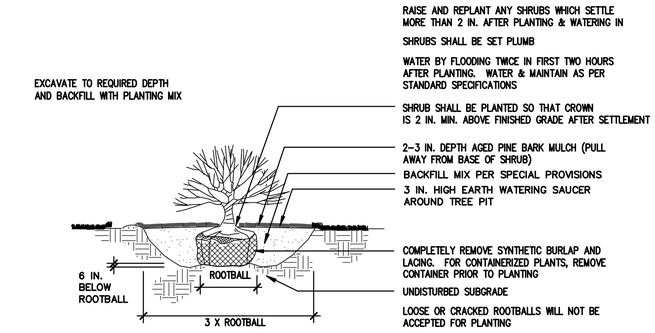




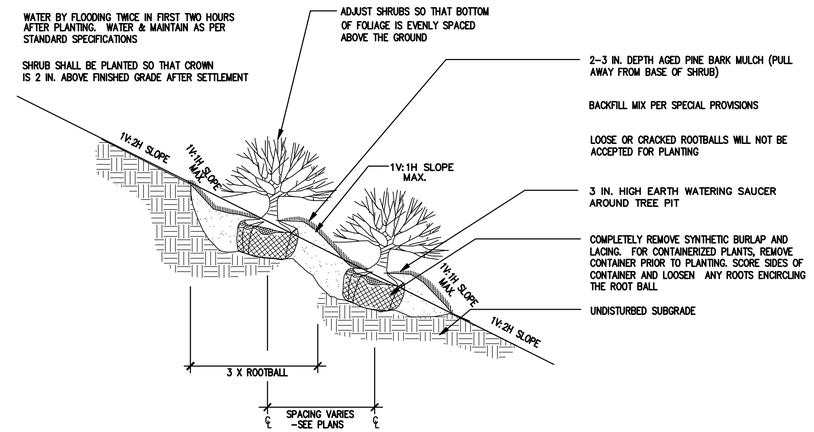
PLANT LIST				
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	4	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	2 – 3 FEET
CA	5	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 – 3 FEET
IVM	2	ILEX VERTICILLATA	WINTERBERRY – MALE	24 – 30 INCH
IVF	15	ILEX VERTICILLATA	WINTERBERRY – FEMALE	24 – 30 INCH
IGC	29	ILEX GLABRA 'COMPACTA'	INKBERRY – COMPACT	24 – 30 INCH
SC	10	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB – CHENAULT	2 – 3 FEET
DF	11	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18 – 24 INCH

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.



SHRUB PLANTING
NOT TO SCALE



CONTAINERIZED SHRUB PLANTING (SLOPE) DETAIL
NOT TO SCALE

GRAPHIC SCALE
0 5 10 15 20 30 FEET

IN CHARGE OF GJH
DESIGNED BY MDE
CHECKED BY GJH
DRAWN BY MJE
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	62	137
PROJECT FILE NO. 604532				

LANDSCAPING PLAN

EROSION CONTROL NOTES:

GENERAL

IT IS THE INTENT OF THE CONTRACT PLANS AND DETAILS TO CONTROL EROSION AND SEDIMENTATION IN ALL PORTIONS OF THE SITE. THE CONTRACTOR IS ALERTED THAT CONTROL OF EROSION AND SEDIMENTATION IS CONSIDERED TO BE ESPECIALLY IMPORTANT IN AND AROUND THE AREAS SHOWN ON THE PLANS AND DELINEATED AS WETLANDS. THE CONTRACTOR IS TO IMPLEMENT THE EROSION AND SEDIMENTATION CONTROLS INDICATED ON THE PLANS, IN ACCORDANCE WITH THE FOLLOWING NOTES, BUT IS ALERTED TO THE FACT THAT ADDITIONAL MEASURES MAY BE REQUIRED TO COMPLY WITH THIS INTENT, AS FIELD CONDITIONS MAY WARRANT. SHOULD SUCH MEASURES BE DETERMINED TO BE REQUIRED OR ORDERED BY THE ENGINEER, THEY ARE TO BE IMPLEMENTED IMMEDIATELY.

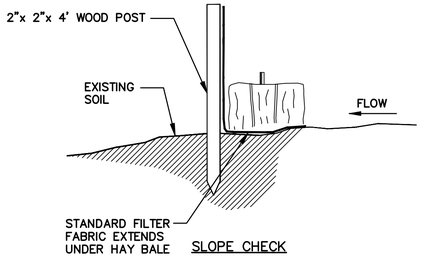
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, THE PROVISIONS OF ALL APPLICABLE PERMITS AND APPROVALS ISSUED BY LOCAL, STATE & FEDERAL REGULATION FOR ACTIVITIES INVOLVING WETLANDS, WATERCOURSES AND/OR EROSION CONTROLS, AND AS DIRECTED BY THE ENGINEER. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, MARCH 1997 AND THE U.S.D.A. SCS'S EROSION AND SEDIMENT CONTROL IN SITE DEVELOPMENT, MASSACHUSETTS CONSERVATION GUIDE, SEPTEMBER 1983.
2. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITEWORK, SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL REMAIN IN PLACE UNTIL ALL SITEWORK IS COMPLETED AND GROUND COVER IS ESTABLISHED (AT LEAST 75% UNIFORM COVERAGE BY NEW SEEDLINGS).
3. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL INSPECT THE EROSION CONTROLS DAILY AND CLEAN ACCUMULATED MATERIALS FROM BEHIND THEM, AS NECESSARY. ALL EROSION AND SEDIMENTATION CONTROL MEASURES FOUND TO BE IN NEED OF REPAIR OR REPLACEMENT SHALL BE IMMEDIATELY CORRECTED, SO AS TO MAINTAIN THE INTEGRITY OF THE EROSION AND SEDIMENTATION CONTROL SYSTEM.
4. SEDIMENT REMOVED FROM CONTROL STRUCTURES SHALL BE DISPOSED IN A MANNER DESCRIBED IN THE MAINTENANCE PLAN FILED WITH THE CONSERVATION COMMISSION. NO EQUIPMENT OR MATERIAL OF ANY KIND SHALL BE STOCKPILED OR DEPOSITED IN ANY REGULATED AREA, UNLESS SPECIFICALLY SHOWN ON THE CONTRACT PLANS OR AUTHORIZED BY PROJECT PERMITS/APPROVALS.
5. STOCKPILED SOIL SHALL BE SURROUNDED WITH SILTATION FENCES TO PREVENT AND CONTROL SILTATION AND EROSION. STOCKPILES THAT WILL REMAIN EXPOSED FOR MORE THAN 30 DAYS, SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER.
6. ALL DISTURBED AREAS THAT WILL REMAIN EXPOSED OR UNDISTURBED FOR A PERIOD OF FOURTEEN (14) DAYS OR LONGER, SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER.
7. CULVERT/PIPE INLETS AND OUTFALLS SHALL BE STABILIZED WITH STONE FOR PIPE ENDS OR OTHER APPROVED PERMANENT EROSION CONTROL MEASURES, IMMEDIATELY FOLLOWING PIPE INSTALLATION.
8. THERE SHALL BE NO DIRECT DISCHARGE FROM ANY REQUIRED DEWATERING OPERATIONS INTO ANY WETLAND, WATERCOURSE, OR DRAINAGE SYSTEM, WITHOUT THE APPROVAL OF THE ENGINEER, AND THEN ONLY AS ALLOWED BY REGULATORY PERMITS. ANY DEWATERING DISCHARGE CONTAINING SETTLEABLE SOLIDS (SEDIMENTS) SHALL BE PASSED THROUGH A SEDIMENTATION CONTROL BASIN OR SIMILAR TREATMENT, APPROVED BY THE ENGINEER, TO REMOVE THESE SOLIDS. CONTRACTOR SHALL MAINTAIN SAID SEDIMENT CONTROL DEVICE THROUGHOUT THE ENTIRE DEWATERING OPERATION AND SHALL CEASE DEWATERING, IF DEFICIENCIES ARE NOTED, UNTIL THE DEFICIENCIES ARE CORRECTED.
9. EARTHWORK ACTIVITY SHALL BE PERFORMED IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO THE TEMPORARY DRAINAGE SWALES AND SEDIMENTATION BASINS. IN NO CASE SHALL RUNOFF FROM ROADWAYS OR OTHER AREAS, UPGRADIENT FROM EMBANKMENTS, BE ALLOWED TO RUN DOWN ANY CUT OR FILL SLOPE, WITHOUT THE APPROVAL OF THE ENGINEER.
10. THE CONTRACTOR SHALL INSPECT ALL PORTIONS OF THE SITE IN ANTICIPATION OF RAINFALL EVENTS TO DETERMINE IF SITE GRADING IS SUFFICIENT TO PREVENT EROSION OF SLOPES AND/OR THE TRANSPORTATION OF SEDIMENTS TO WETLANDS OR WATERCOURSES, WITHIN THE PROJECT LIMITS. SHOULD ADDITIONAL MEASURES BE REQUIRED, THEY ARE TO BE IMPLEMENTED IMMEDIATELY. IN NO CASE SHALL THE INSTALLATION OF ADDITIONAL MEASURES, NECESSARY TO PROTECT SLOPES WITHIN THE PROJECT LIMITS, BE DELAYED BEYOND THE COMMENCEMENT OF PRECIPITATION.
11. PROPOSED STORM WATER TREATMENT BASINS SHALL BE USED AS TEMPORARY SEDIMENTATION BASINS THROUGHOUT CONSTRUCTION OF ADJACENT ROADWAYS AND EMBANKMENTS, AND STORM WATER FROM CONSTRUCTION ACTIVITIES SHALL BE ROUTED TO THESE BASINS AS NECESSARY, TO PROTECT LOCAL WETLANDS AND WATERCOURSES FROM SILTATION. BASINS SHALL BE CLEANED OF SEDIMENT, AS REQUIRED, DURING THIS CONSTRUCTION. UPON THE COMPLETION OF THE CONSTRUCTION ACTIVITIES IN THE AREA TRIBUTARY TO A PARTICULAR BASIN, THE BASIN SHALL BE THOROUGHLY CLEANED OF SEDIMENT AND THEN GRADED AND PLANTED AS SHOWN ON THE CONTRACT PLANS.
12. ALL DISTURBED EARTH SLOPES SHALL BE STABILIZED WITH PERMANENT VEGETATIVE COVER AS SOON AS POSSIBLE. DISTURBED AREAS, THAT ARE NOT SUBJECT TO CONSTRUCTION TRAFFIC, SHALL RECEIVE A PERMANENT OR TEMPORARY VEGETATIVE COVER AS SOON AS FINAL CONTOURS ARE ESTABLISHED. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A VEGETATIVE COVER, DISTURBED AREAS SHALL BE THOUROUGHLY MULCHED. MULCHED AREAS SHALL BE SEEDED AS SOON AS WEATHER CONDITIONS ALLOW.
13. ALL SLOPES STEEPER THAN 2H:1V SHALL BE COVERED WITH MODIFIED ROCKFILL AND AN APPROVED EROSION CONTROL MATTING. SEE SLOPE EROSION CONTROL DETAIL FOR SLOPES STEEPER THAN 2H:1V.
14. A STOCKPILE OF EXTRA SILTATION FENCE AND CRUSHED STONE SHALL BE KEPT ON SITE THROUGHOUT THE CONSTRUCTION WORK. THIS MATERIAL SHALL BE INSTALLED AT THE DIRECTION OF THE ENGINEER TO MITIGATE ANY EROSION/SEDIMENTATION CONDITIONS WHICH MAY ARISE.
15. FOR LOCATION OF PROPOSED EROSION CONTROL MEASURES, SEE PLANS. AREAS DISTURBED BY EROSION BARRIERS, SHALL BE LOAMED AND SEEDED, OR OTHERWISE RESTORED TO ORIGINAL CONDITIONS.
16. CONTRACTOR SHALL REMOVE ALL SEDIMENTATION CONTROL SYSTEMS, REMOVE ALL ACCUMULATED SEDIMENTS, AND SEED THE DISTURBED AREAS, WHEN THE CONTROL SYSTEMS ARE NO LONGER REQUIRED. CONTRACTOR SHALL REQUEST AND RECEIVE PERMISSION FROM THE ENGINEER PRIOR TO REMOVING ANY CONTROL SYSTEM.

CONSTRUCTION SPECIFICATIONS FOR STAKED HAY BALES

BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 3". BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY PLACED BALE TO FORCE THE BALES TOGETHER. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS DIRECTED BY THE ENGINEER. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

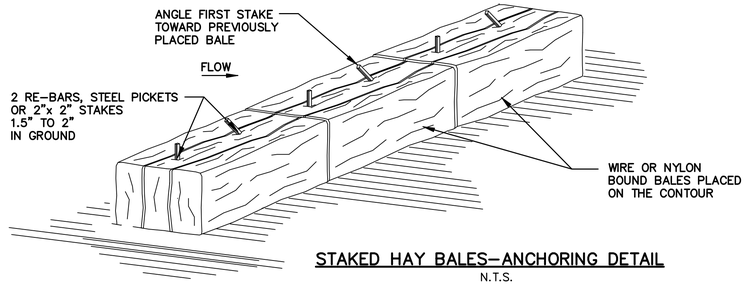
CONSTRUCTION SPECIFICATIONS ON SILTATION & EROSION CONTROL

1. EROSION CONTROL MEASURES SHALL BE INCORPORATED IN THE SEQUENCE OF CONSTRUCTION TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE.
2. AREAS SUBJECT TO EROSION SHALL BE MINIMIZED IN TERMS OF TIME AND AREA.
3. IN GENERAL, WORK REQUIRING EROSION CONTROL INCLUDES EXCAVATIONS, FILLS, DRAINAGE, SWALES AND DITCHES, ROUGH AND FINISH GRADING, AND STOCKPILING OF EARTH.
4. DO NOT DISTURB VEGETATION AND TOPSOIL BEYOND THE PROPOSED LIMIT OF SILT FENCE ACTIVITIES.
5. UPON COMPLETION OF ALL CATCH BASINS, HAY BALES WILL BE PLACED AROUND EACH STRUCTURE TO PREVENT SILTATION, IF DEEMED NECESSARY BY RESIDENT ENGINEER.
6. THE CONTRACTOR SHALL REMOVE TEMPORARY SILT FENCE AND HAYBALE DIKES AND ALL ACCUMULATED SILT AND DEBRIS AFTER COMPLETION OF CONSTRUCTION OPERATIONS. HAYBALE DIKES SHALL BE IN PLACE AT ALL TIMES DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL SILT AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS FROM EACH DRAINAGE STRUCTURE UPON COMPLETION OF THE PROJECT.
8. OBJECTS AND/OR AREAS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND ELEVATION.
9. THE CONTRACTOR SHALL REPLACE ANY SECTION OF HAY BALES OR SILT FENCES DAMAGED DURING ANY PHASE OF CONSTRUCTION.

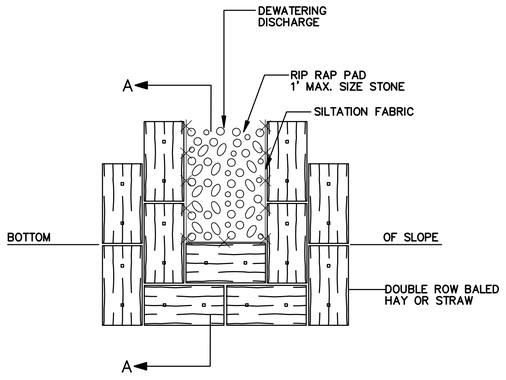


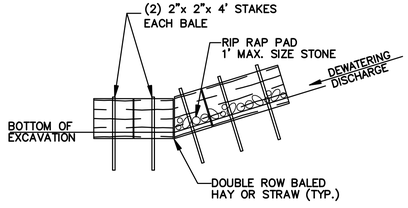
SLOPE CHECK

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH



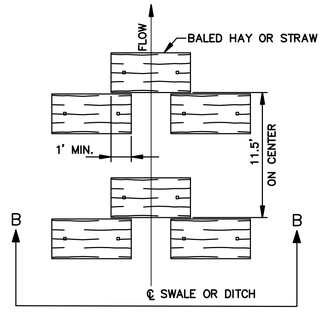
STAKED HAY BALES-ANCHORING DETAIL
N.T.S.



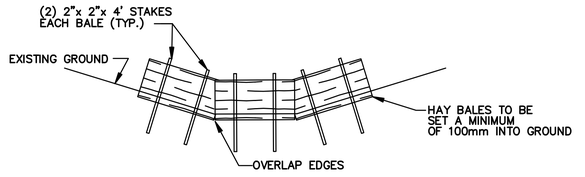


SECTION A-A
N.T.S.

TEMPORARY SEDIMENT TRAP PLAN
N.T.S.



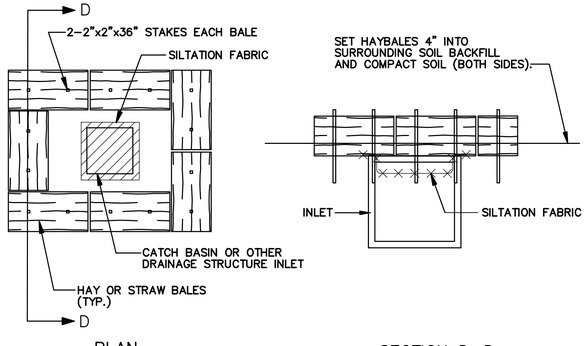
PLAN



SECTION B-B

NOTES:
1. TO BE USED WHERE THE EXISTING GROUND SLOPES TOWARD THE EMBANKMENT AND IN PROPOSED DITCHES AND SWALES.

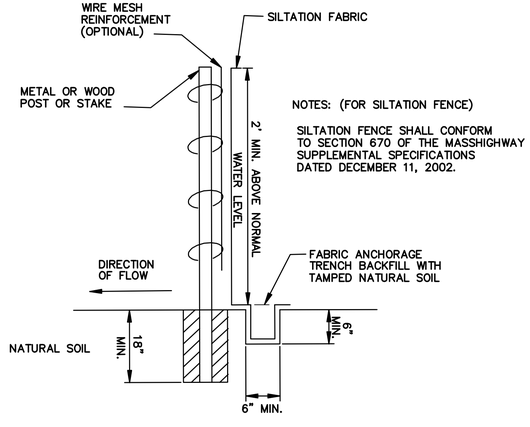
DRAINAGE SWALE OR DITCH EROSION CHECKS
N.T.S.



PLAN

SECTION D-D

CATCH BASIN TREATMENT
N.T.S.



NOTES: (FOR SILTATION FENCE)

SILTATION FENCE SHALL CONFORM TO SECTION 670 OF THE MASSHIGHWAY SUPPLEMENTAL SPECIFICATIONS DATED DECEMBER 11, 2002.

SILTATION FENCE DETAIL
N.T.S.

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	63	137
PROJECT FILE NO. 604532				

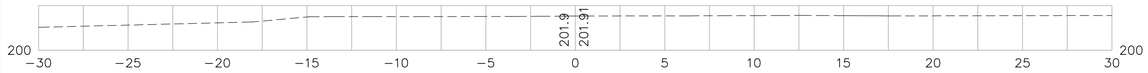
EROSION & SEDIMENTATION CONTROL DETAILS

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	64	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

12+50



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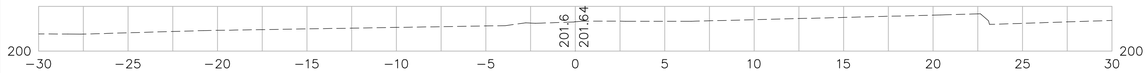

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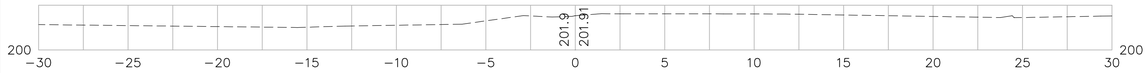

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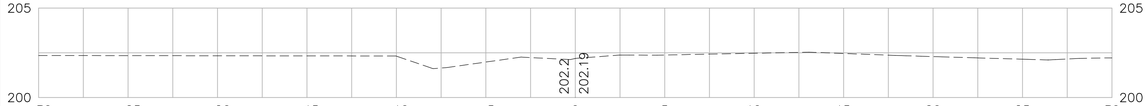

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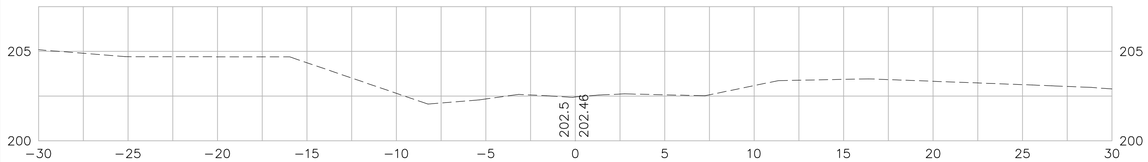

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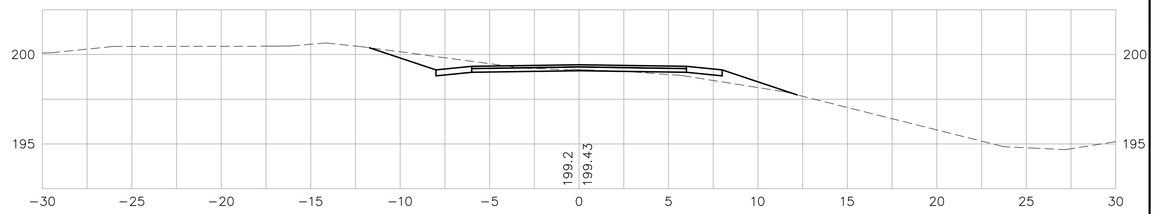

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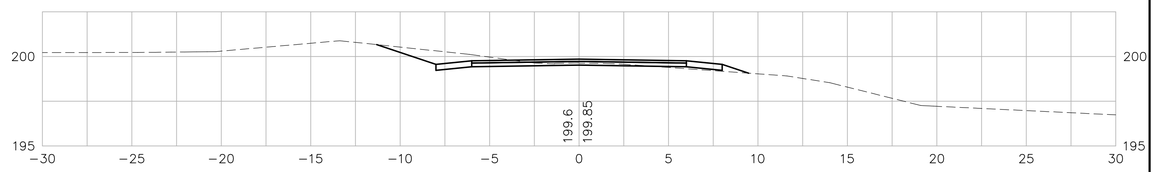

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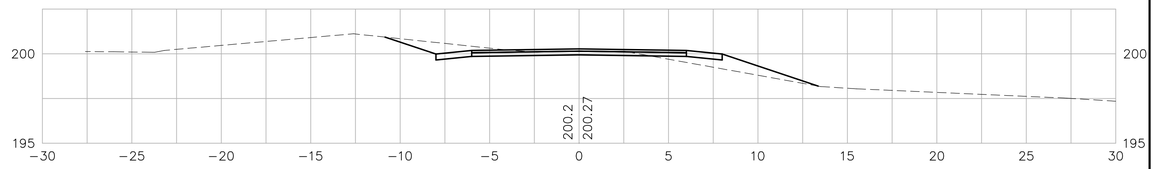

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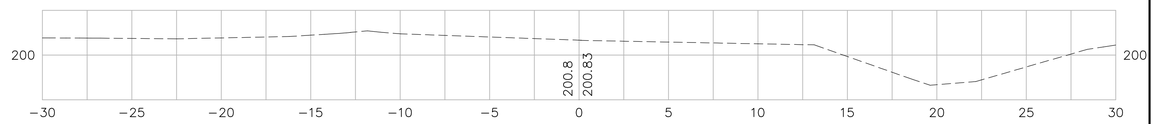
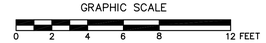


GRAPHIC SCALE



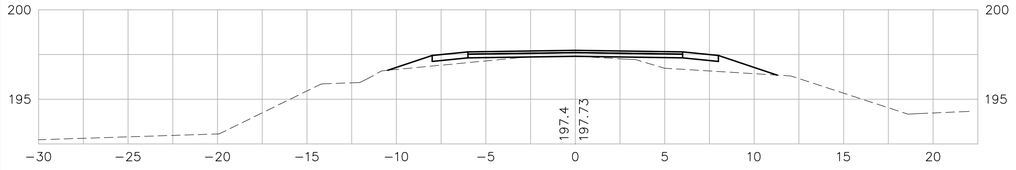
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	65	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

16+50



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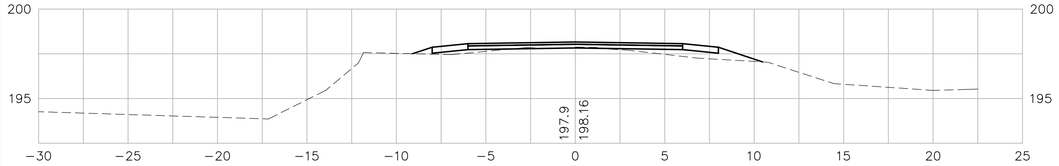

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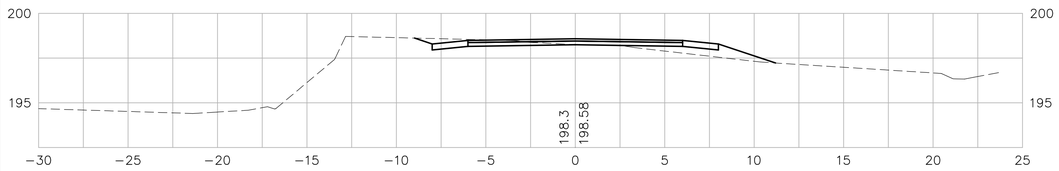

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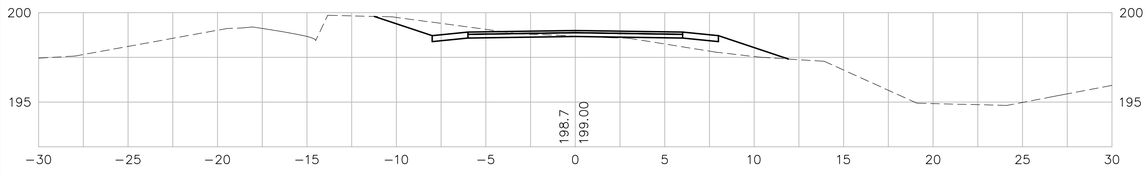

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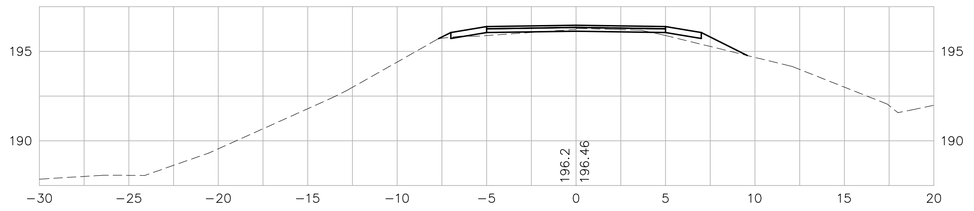

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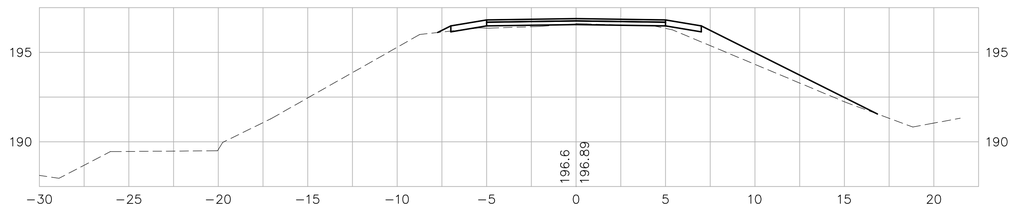

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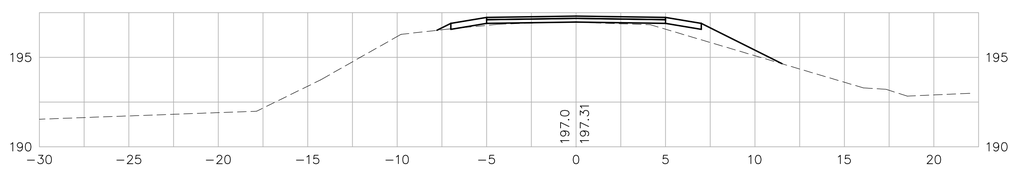


GRAPHIC SCALE
0 2 4 6 8 12 FEET

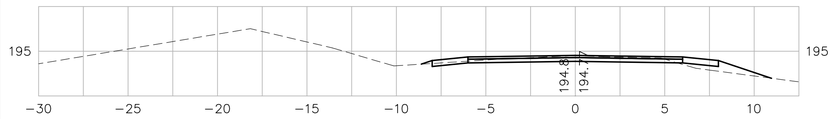
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	66	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

20+00



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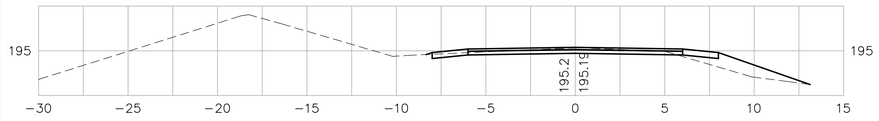

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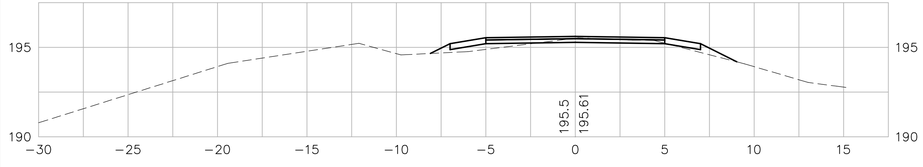

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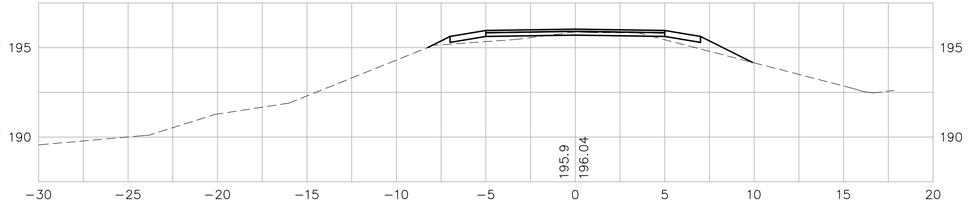

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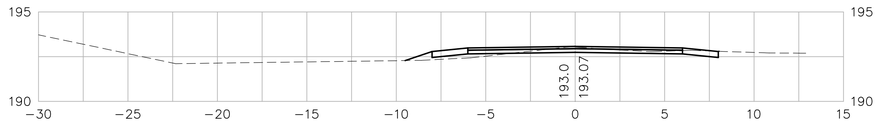

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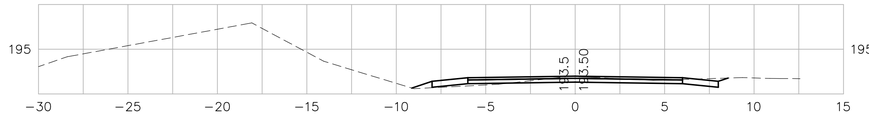

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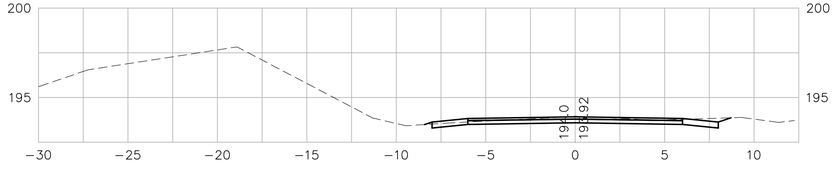

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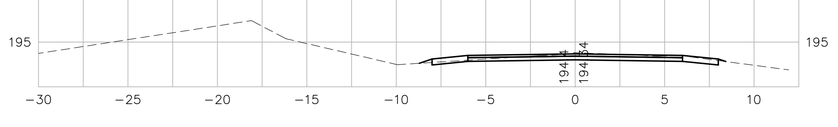


GRAPHIC SCALE

0 2 4 6 8 12 FEET

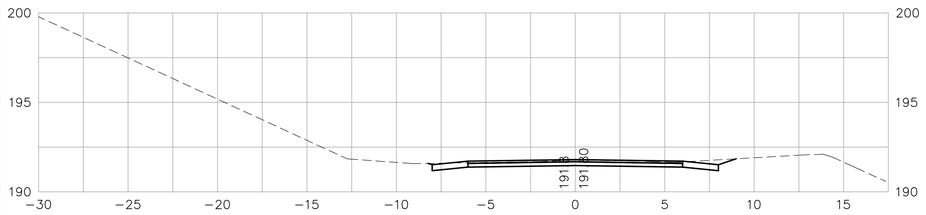
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	67	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

23+50



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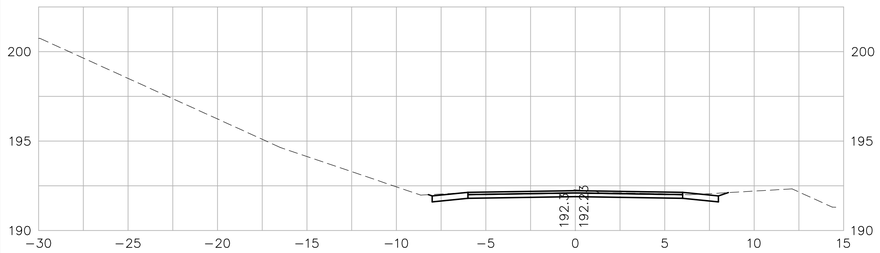

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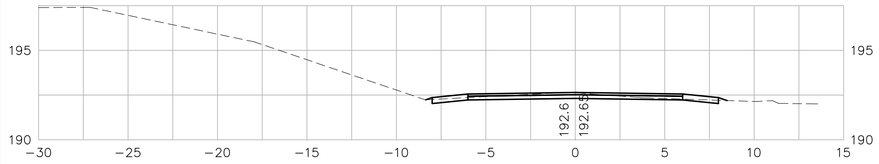

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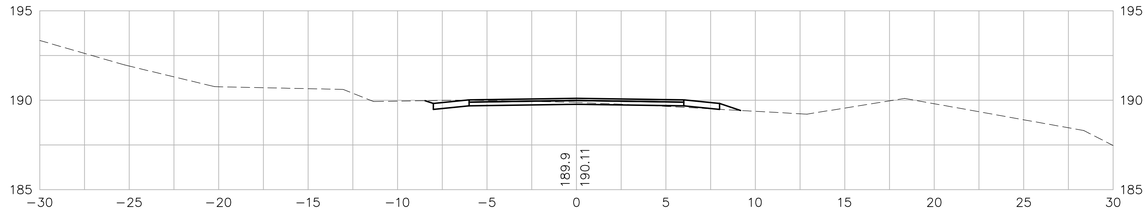

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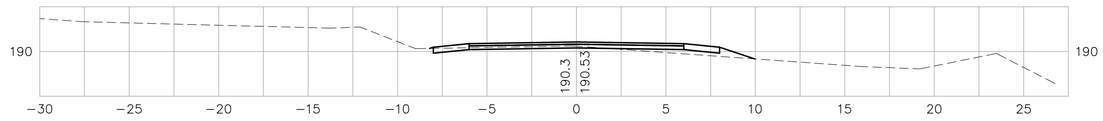

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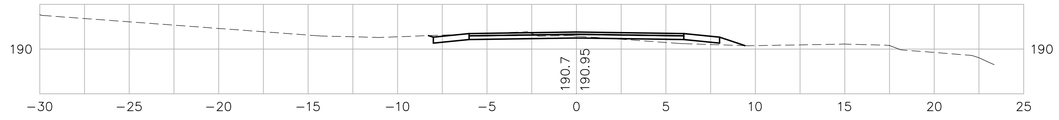

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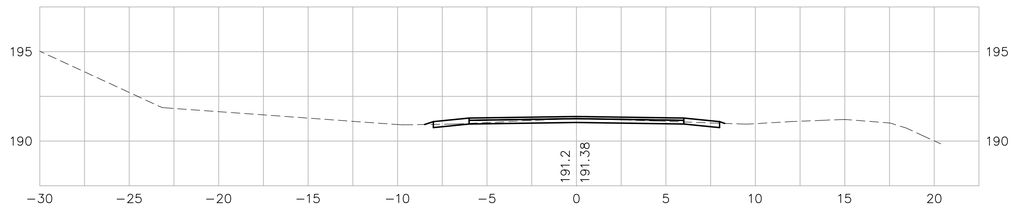


GRAPHIC SCALE
0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

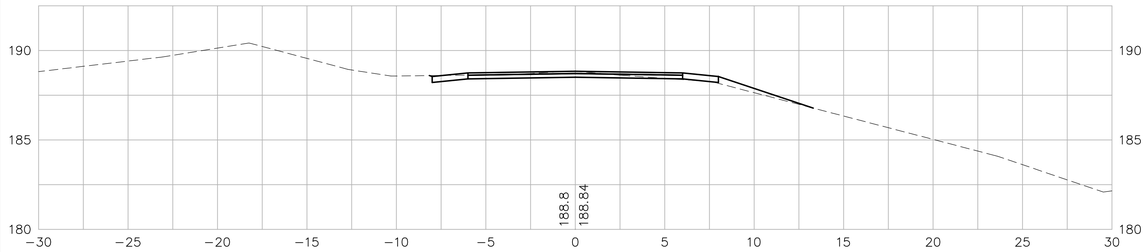
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	68	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

27+00



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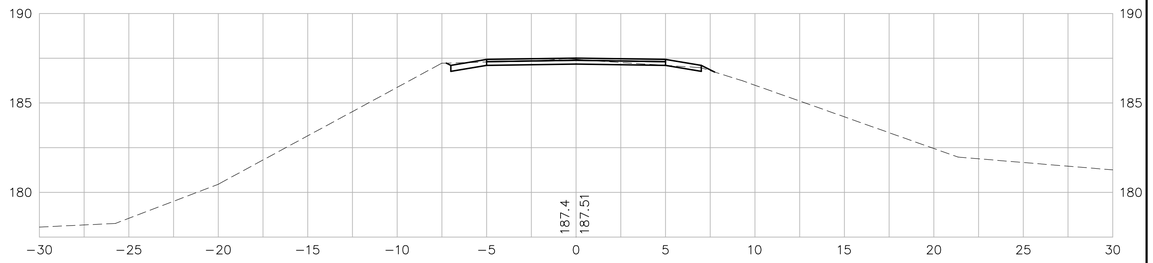

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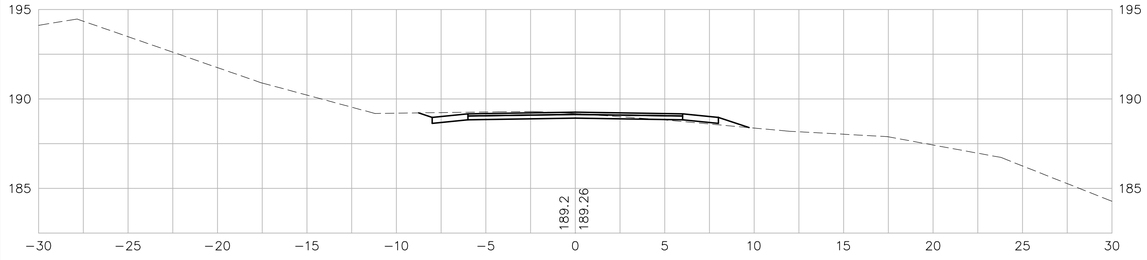

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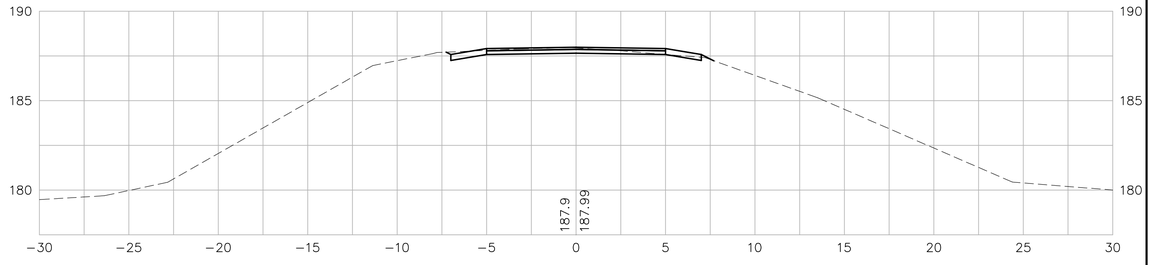

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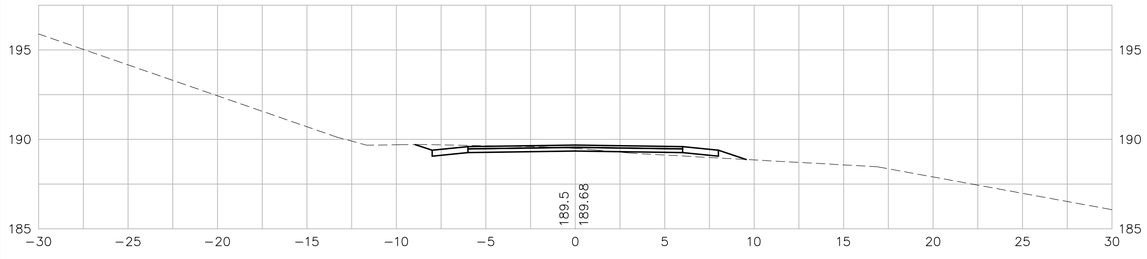

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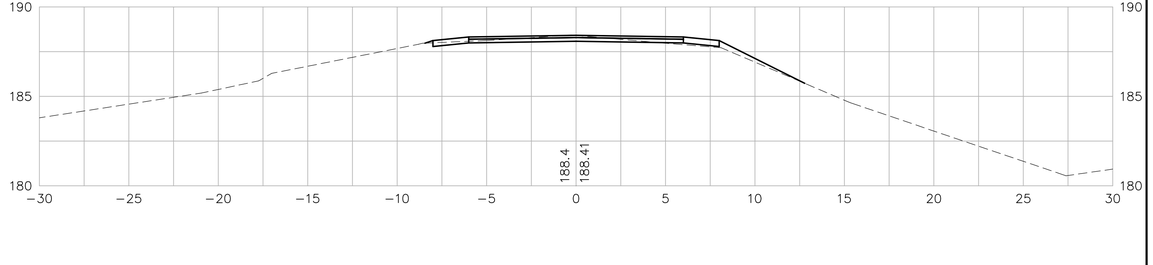


GRAPHIC SCALE

0 2 4 6 8 12 FEET

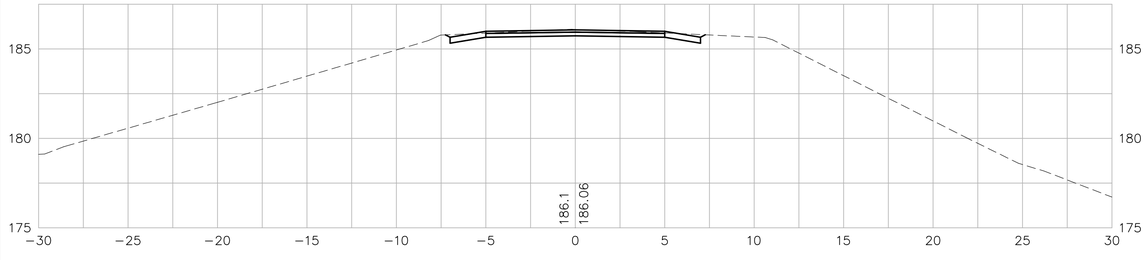
IN CHARGE OF	GJH
DESIGNED BY	CRB
CHECKED BY	GJH
DRAWN BY	CRB
CHECKED BY	GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	69	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

30+00



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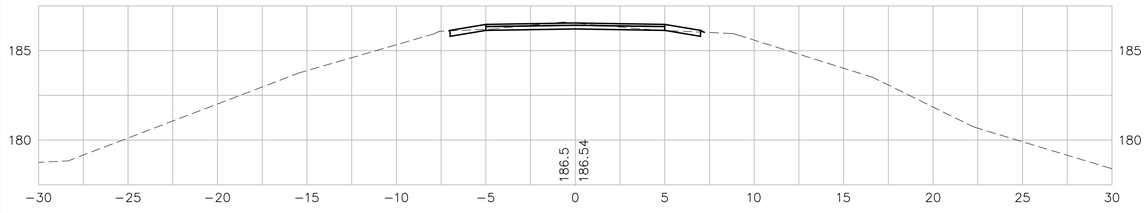

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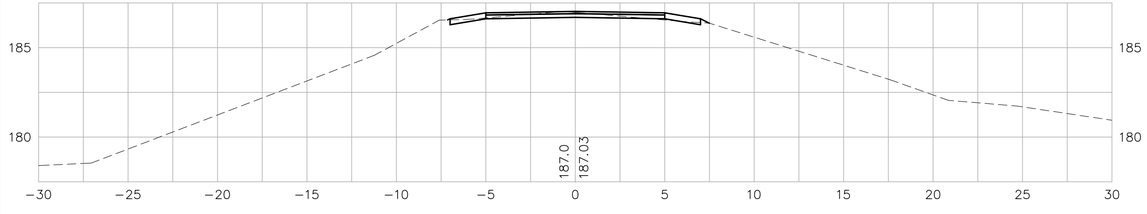

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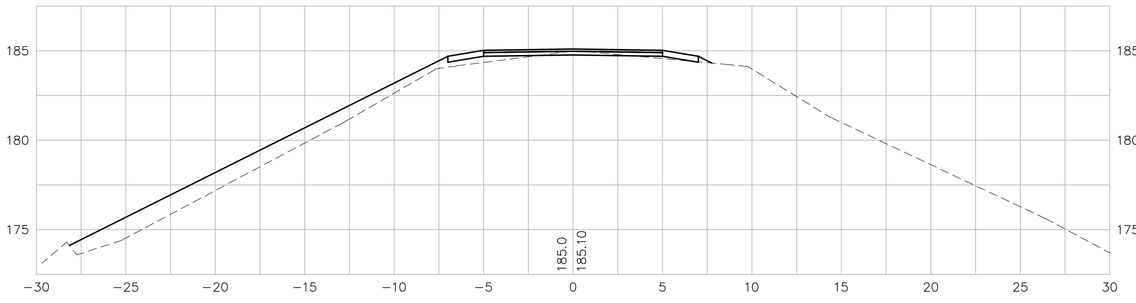

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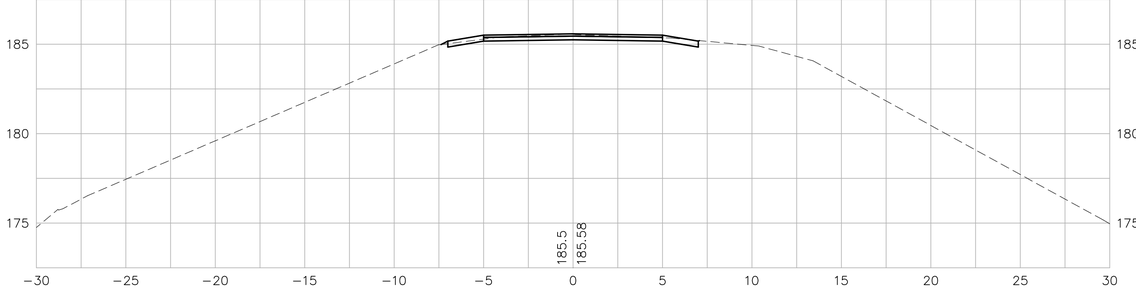


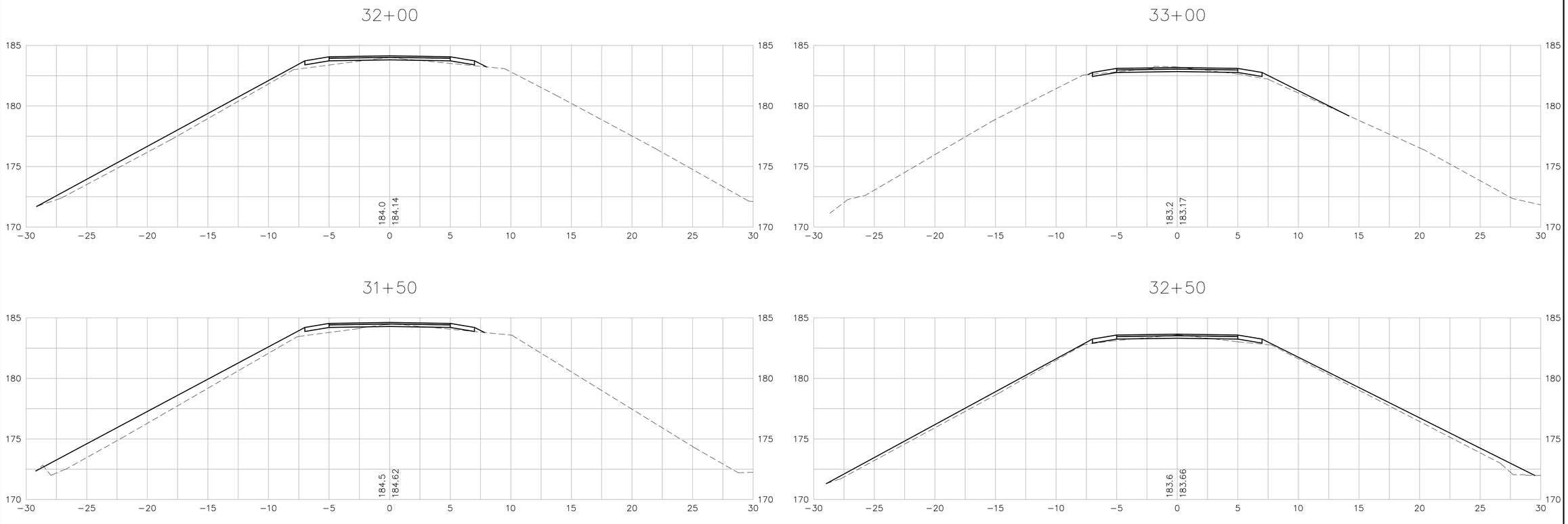
GRAPHIC SCALE
0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	70	137
PROJECT FILE NO. 604532				

CROSS SECTIONS



GRAPHIC SCALE
0 2 4 6 8 12 FEET

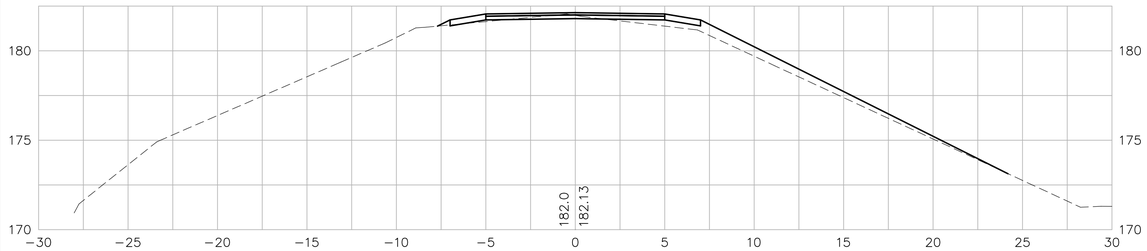
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	71	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

34+50



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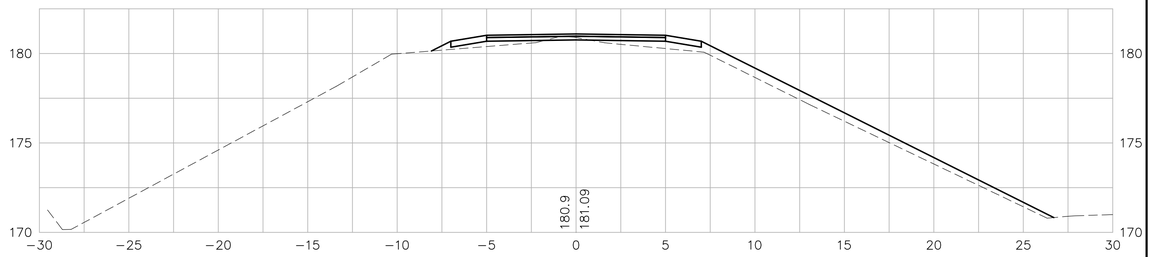

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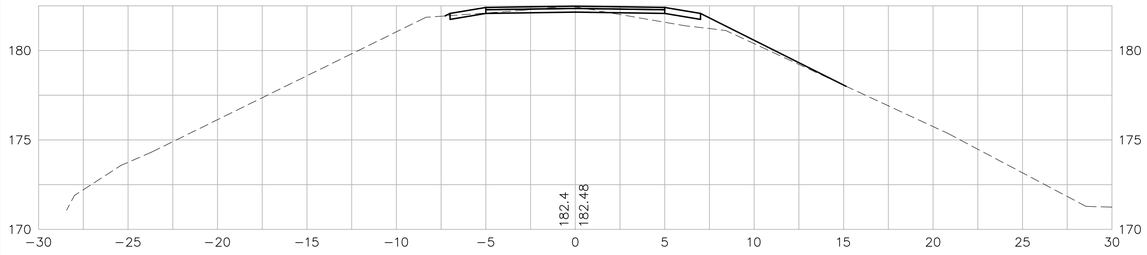
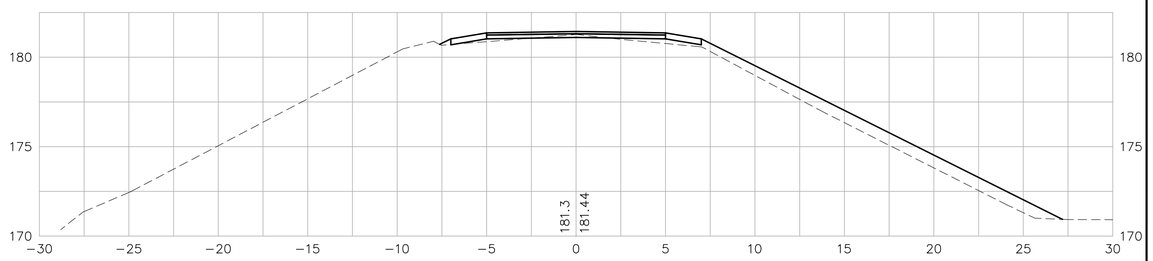
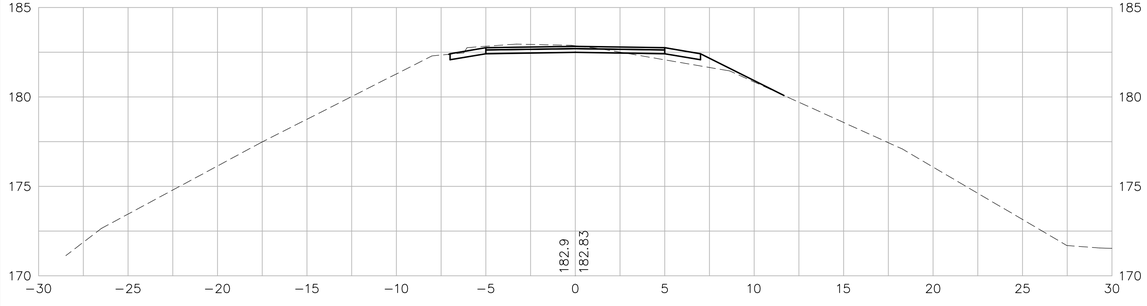


35+50



33+50



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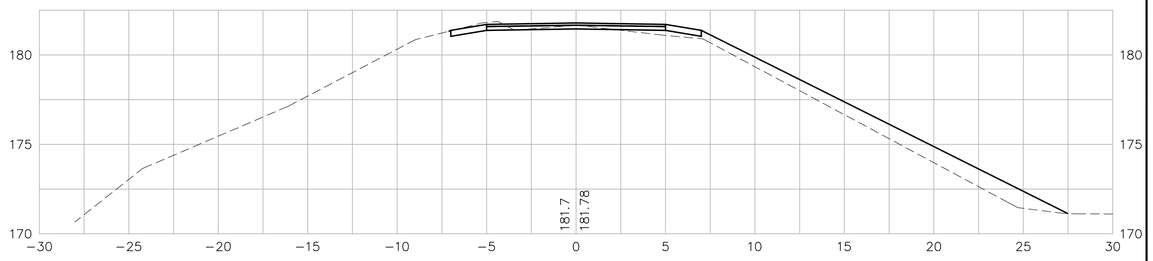


GRAPHIC SCALE

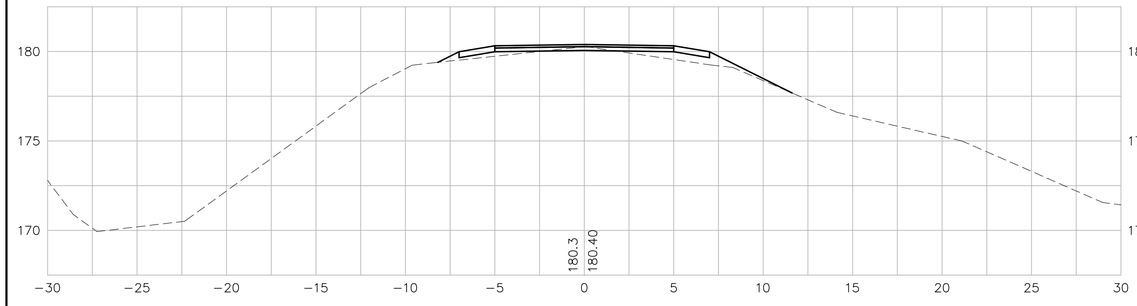
0 2 4 6 8 12 FEET

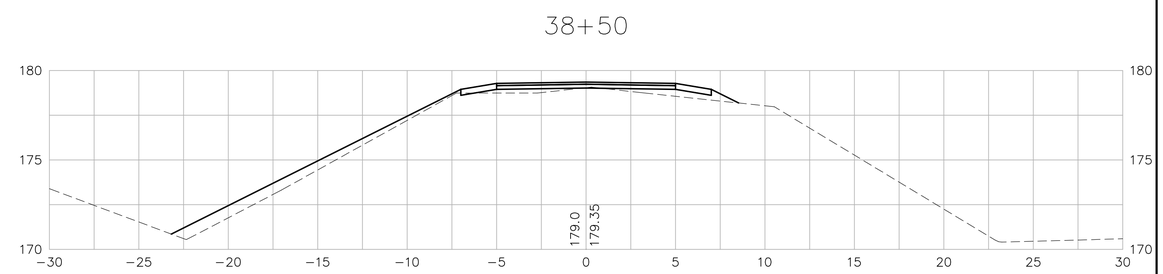
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

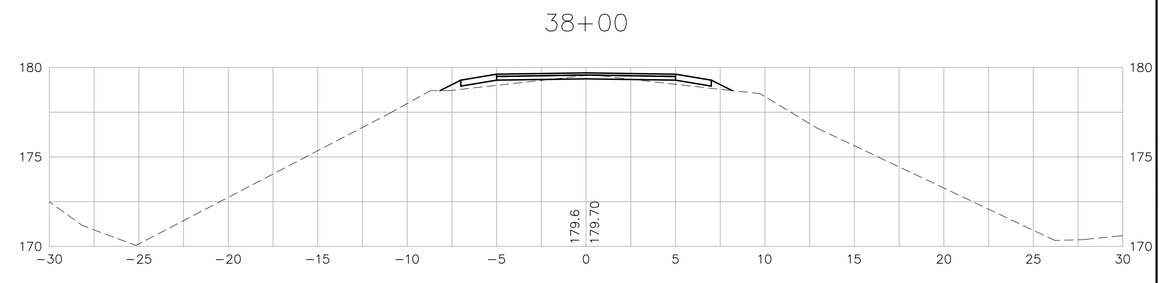
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

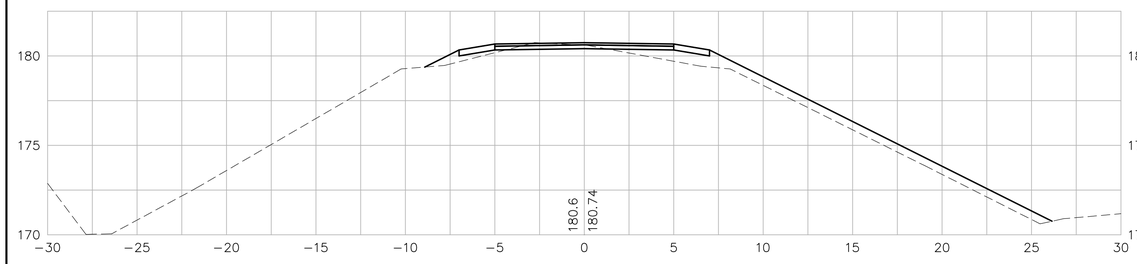
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	72	137
PROJECT FILE NO. 604532				

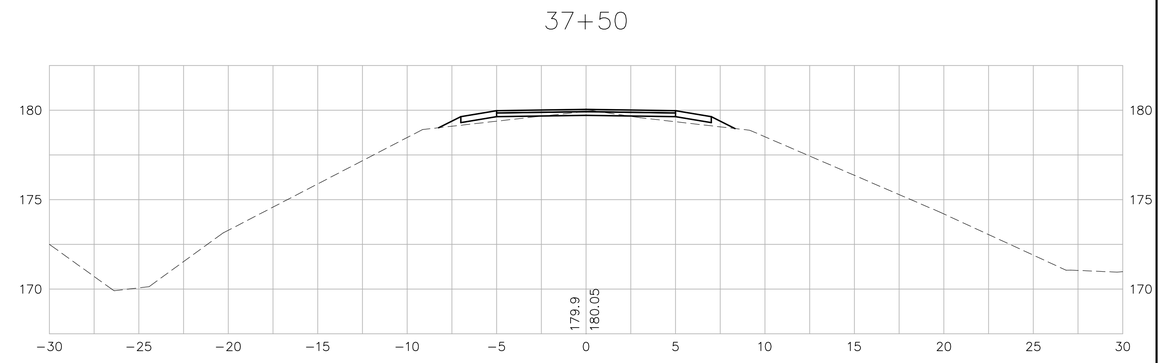
CROSS SECTIONS











GRAPHIC SCALE
0 2 4 6 8 12 FEET

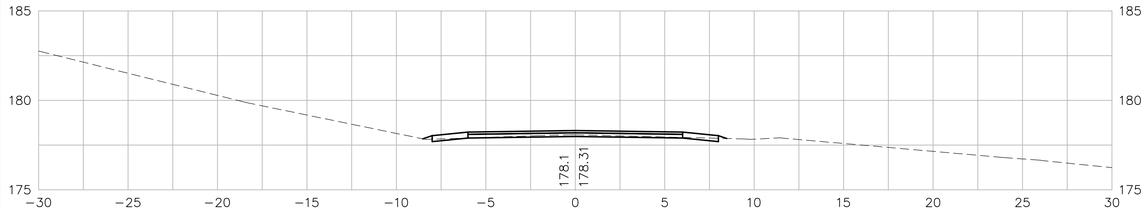
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

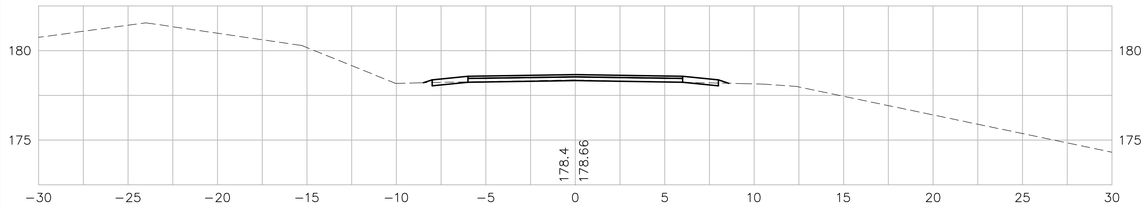
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	73	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

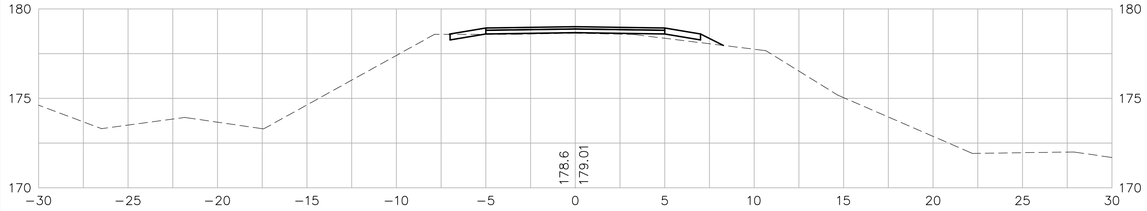
40+00



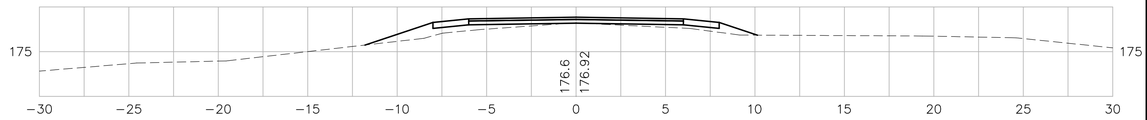
39+50



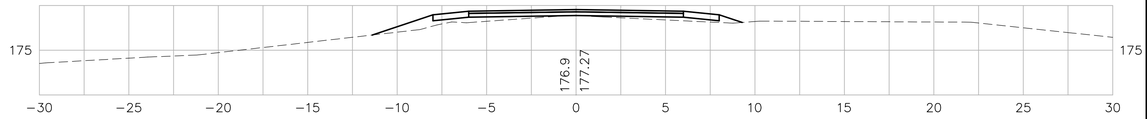
39+00



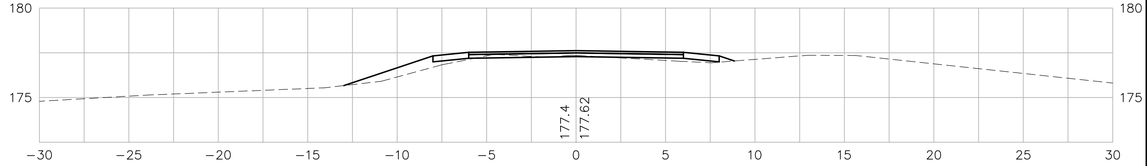
42+00



41+50



41+00



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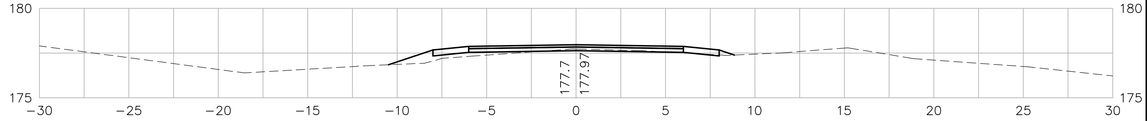


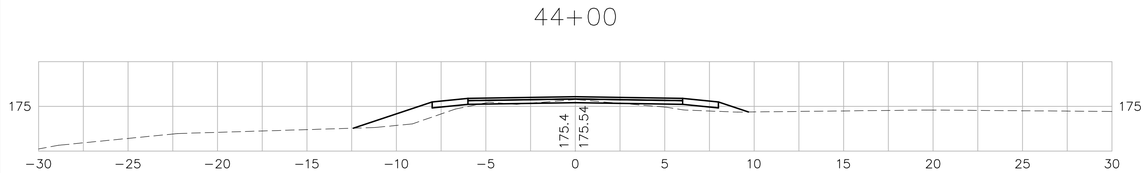
GRAPHIC SCALE
0 2 4 6 8 12 FEET

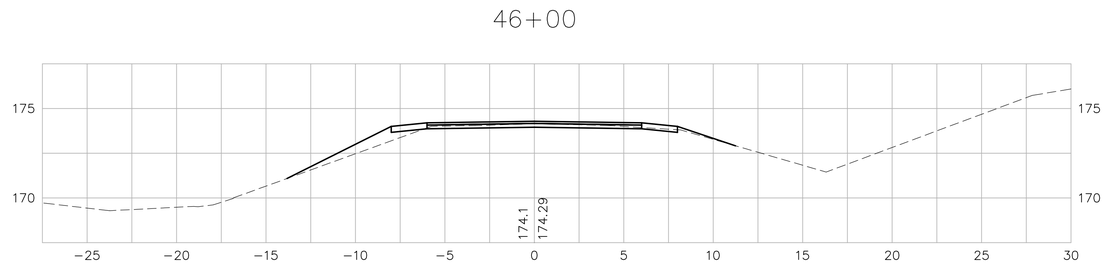
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

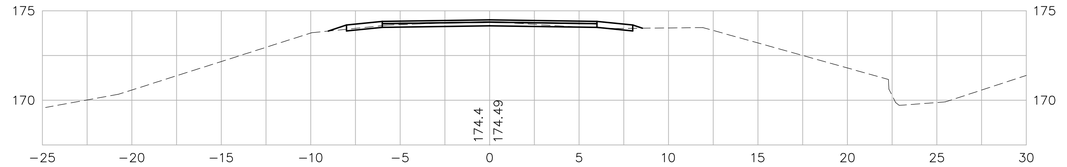
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

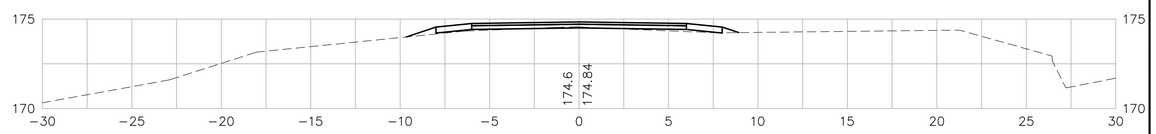
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	74	137
PROJECT FILE NO. 604532				

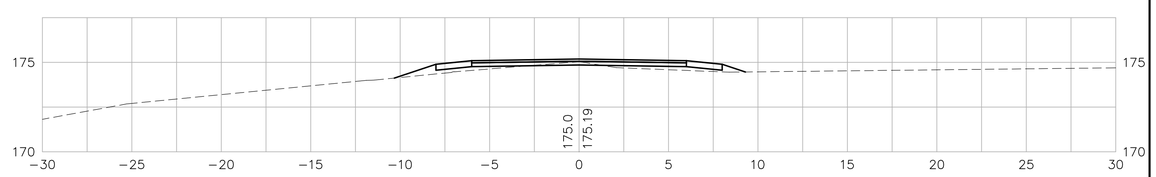
CROSS SECTIONS











GRAPHIC SCALE
0 2 4 6 8 12 FEET

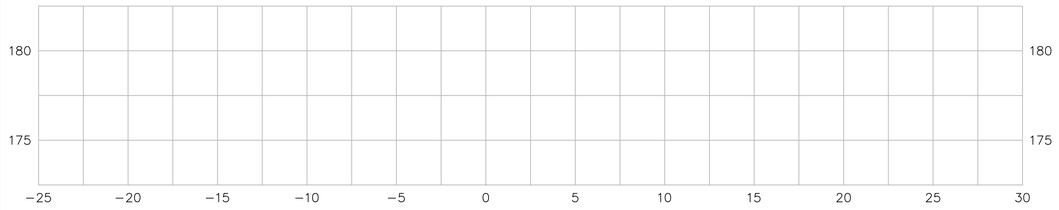
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	75	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

48+00



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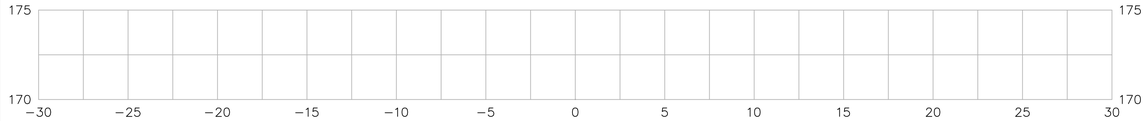

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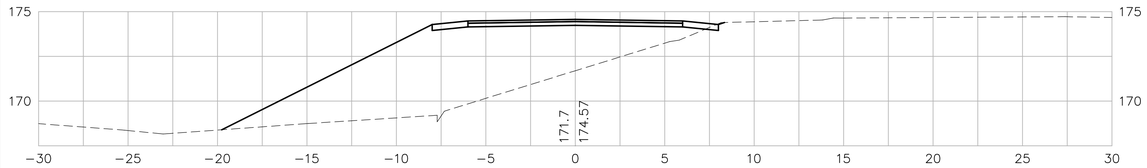
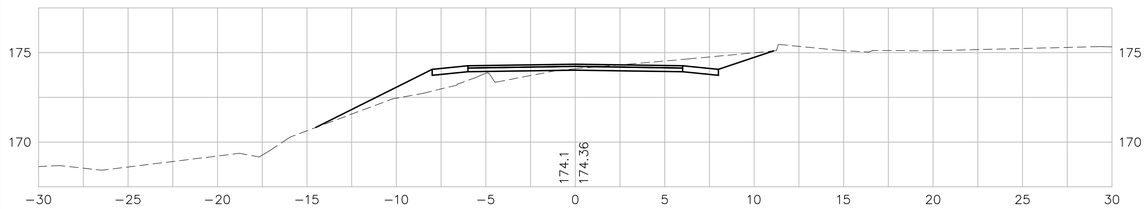
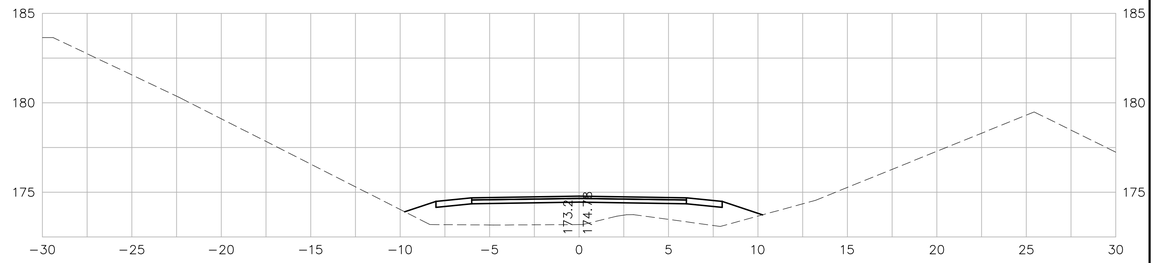


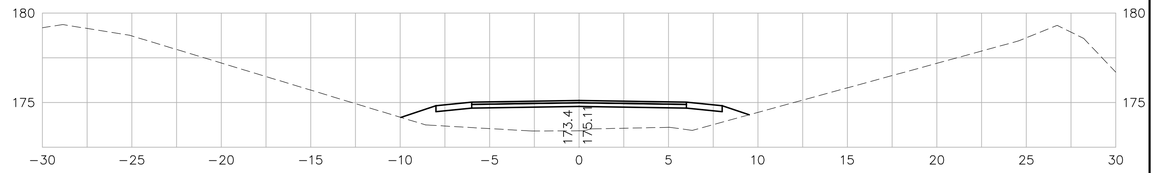
46+50



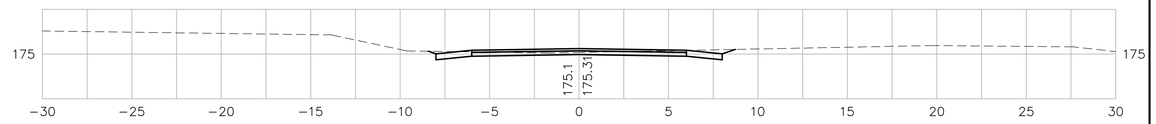
49+50



49+00



48+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

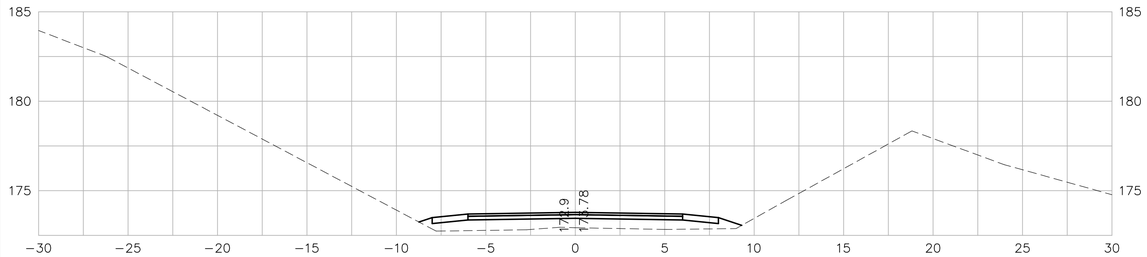
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

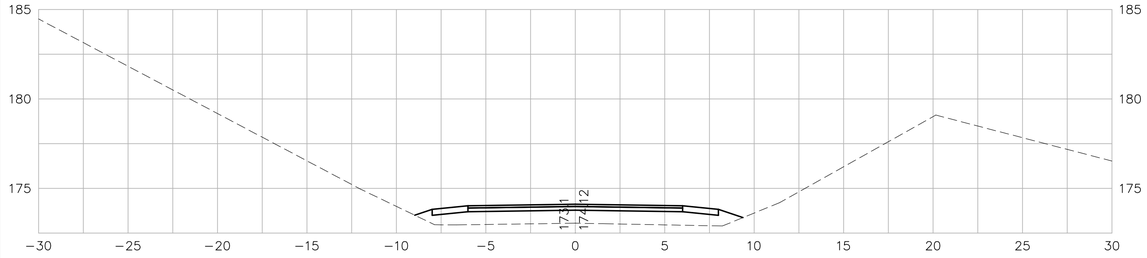
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	76	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

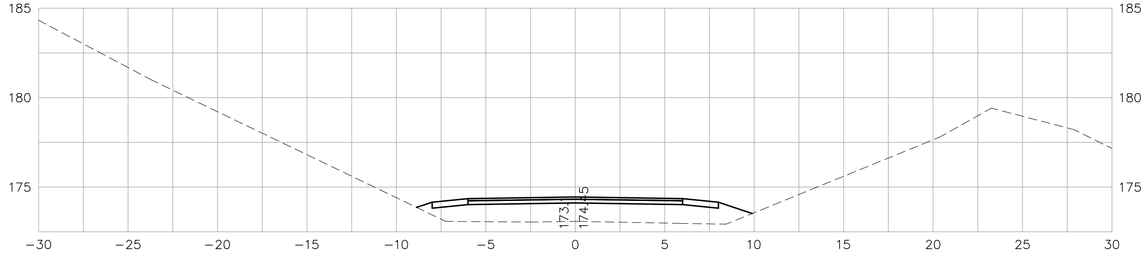
51+00



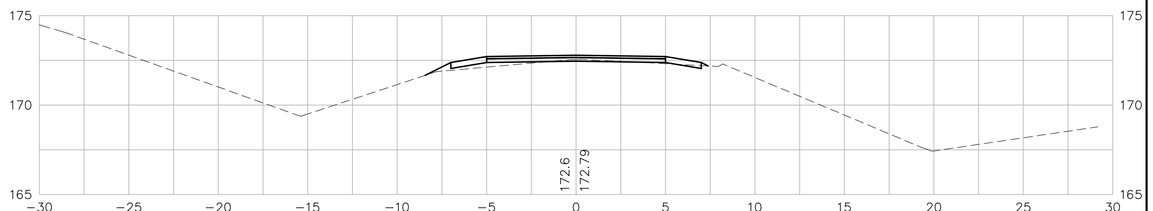
50+50



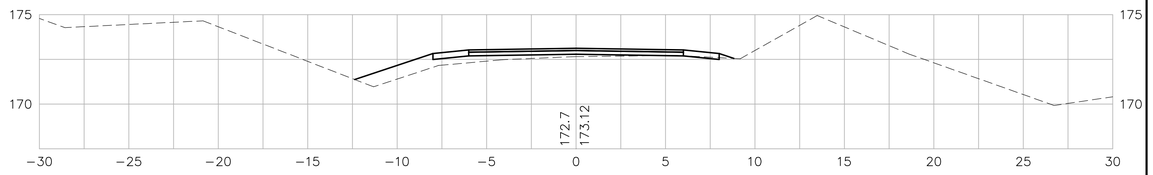
50+00



52+50



52+00



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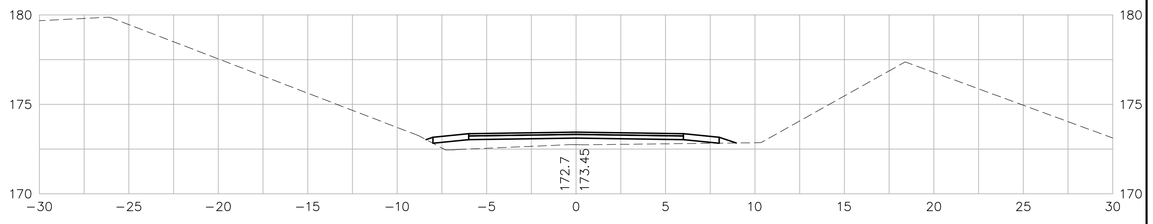


GRAPHIC SCALE

0 2 4 6 8 12 FEET

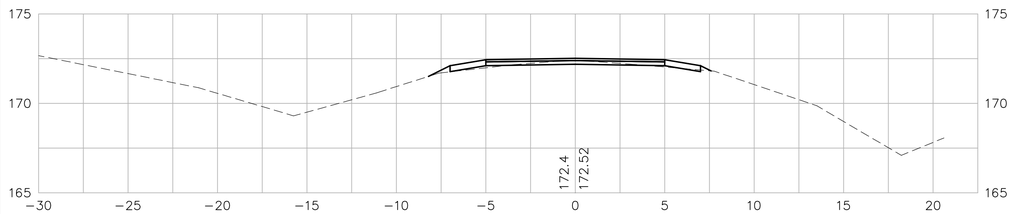
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

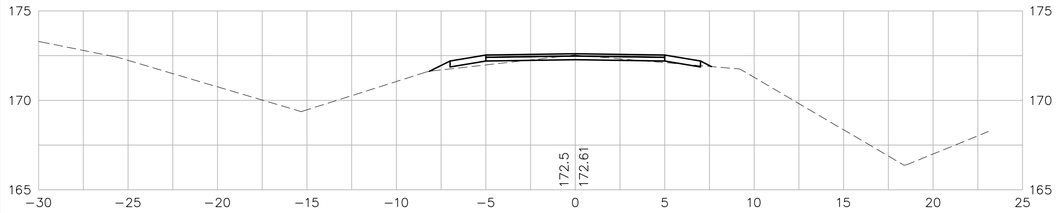
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	77	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

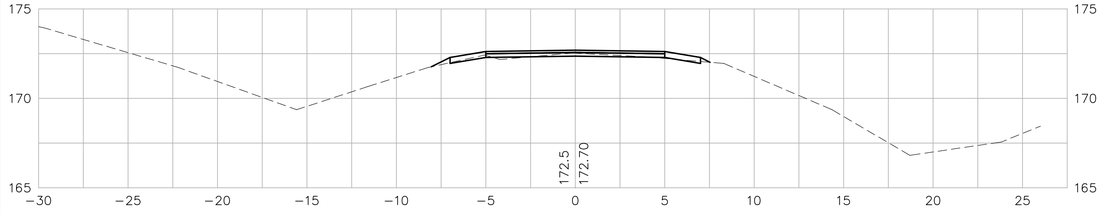
54+00



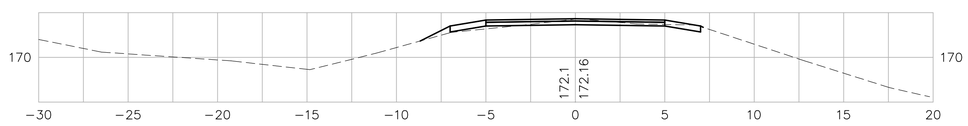
53+50



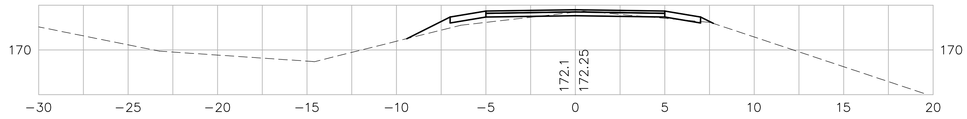
53+00



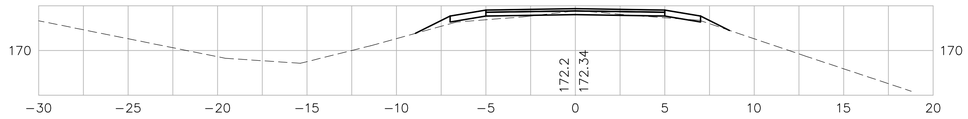
56+00



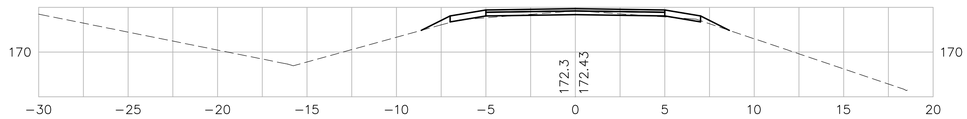
55+50



55+00



54+50



GRAPHIC SCALE
0 2 4 6 8 12 FEET

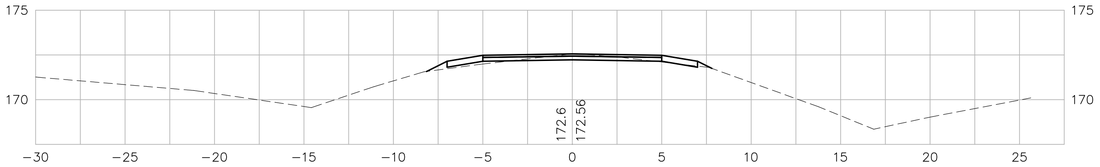
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	78	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

58+00



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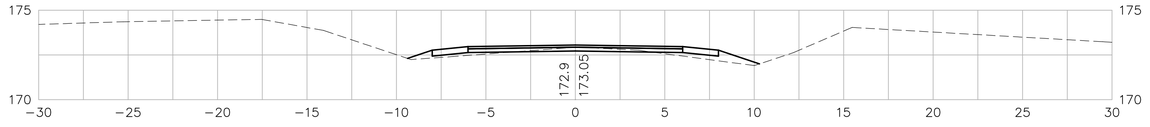

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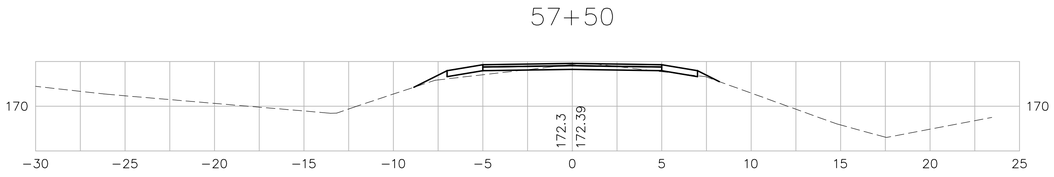
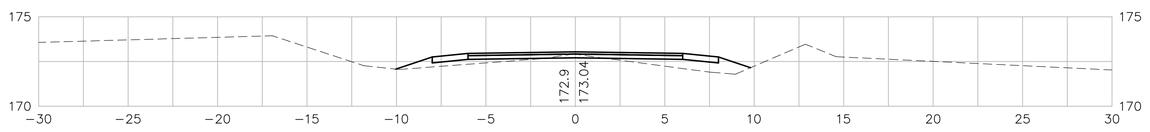


59+50



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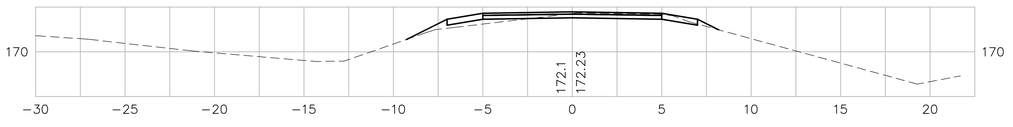
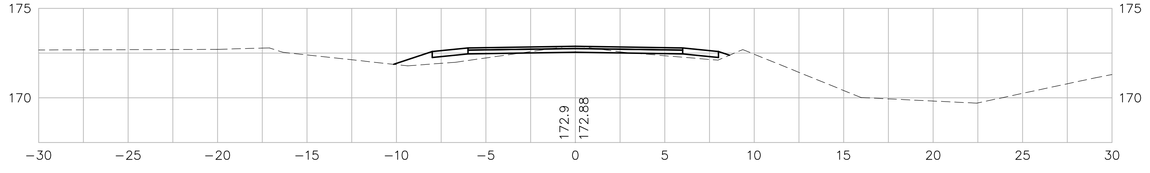
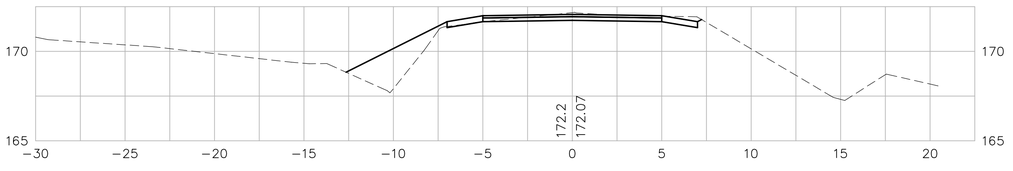


59+00



56+50



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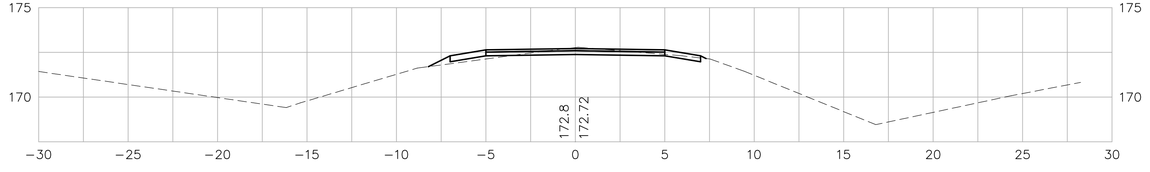
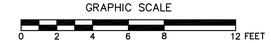


GRAPHIC SCALE



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

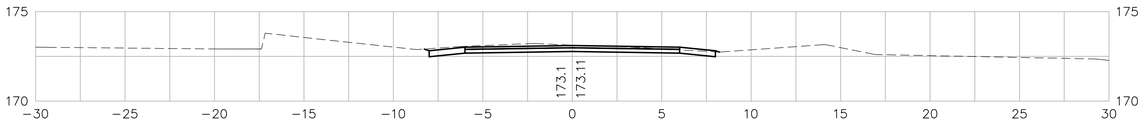
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	79	137
PROJECT FILE NO. 604532				

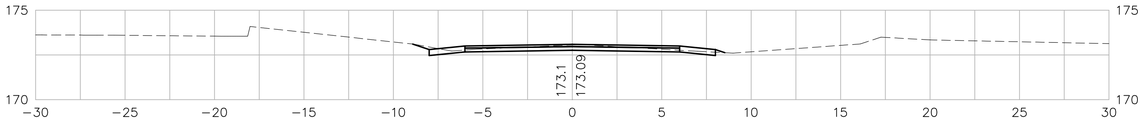
CROSS SECTIONS

62+50

62+00



61+50



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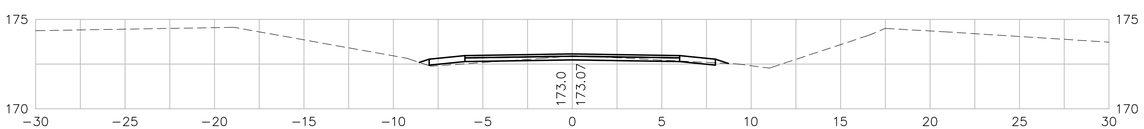
60+50



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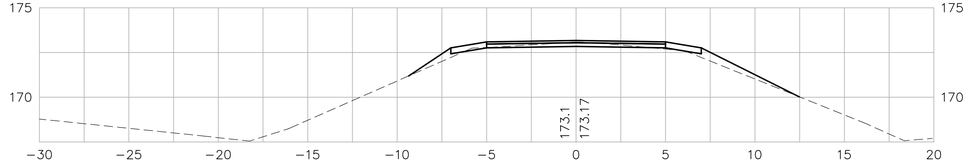

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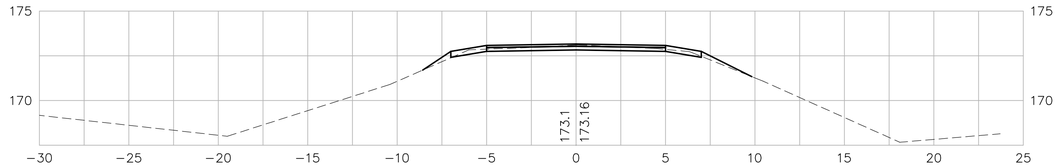
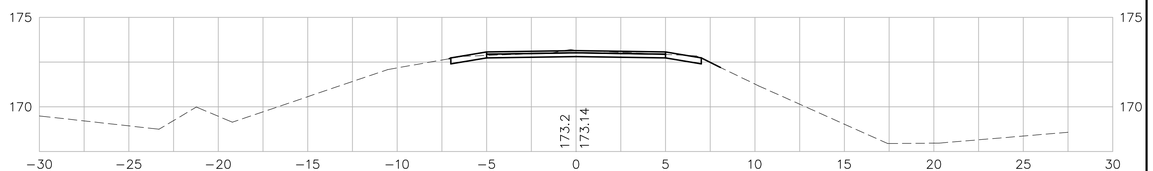
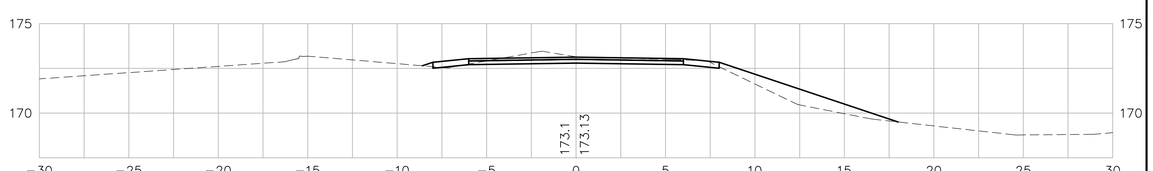


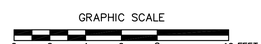
63+50



63+00



GRAPHIC SCALE



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

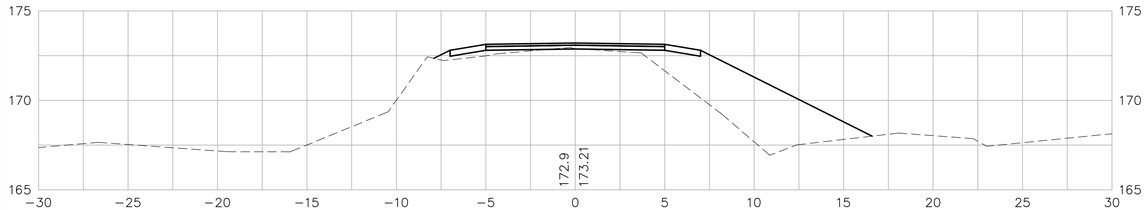
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

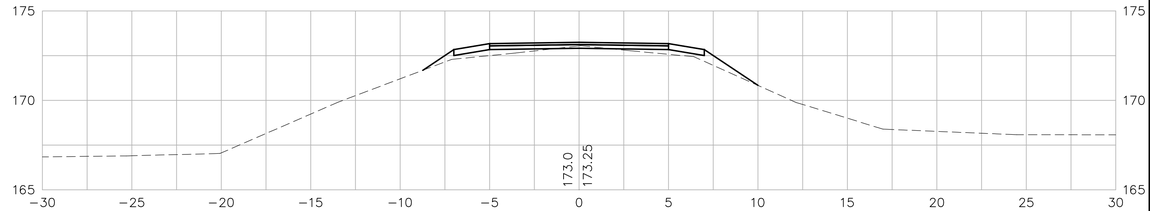
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	80	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

66+00



67+50



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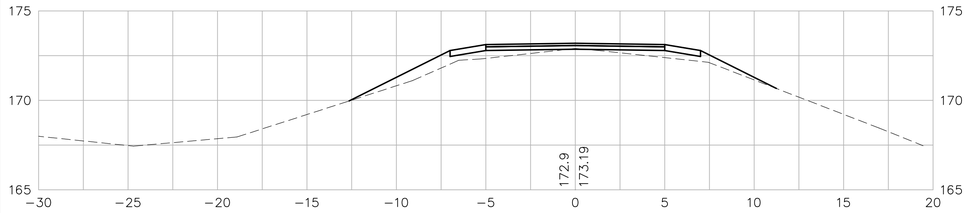

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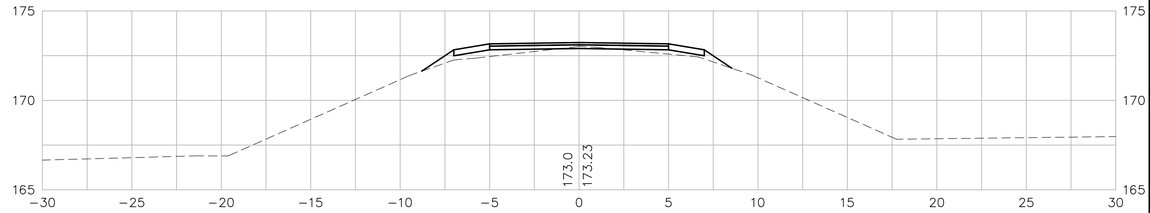

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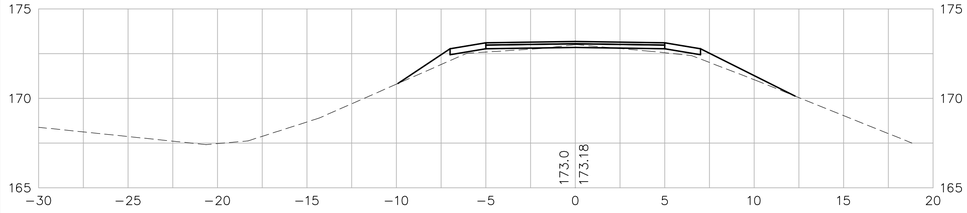
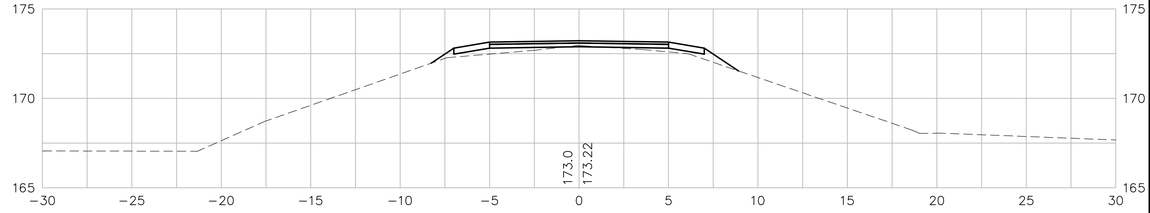


66+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

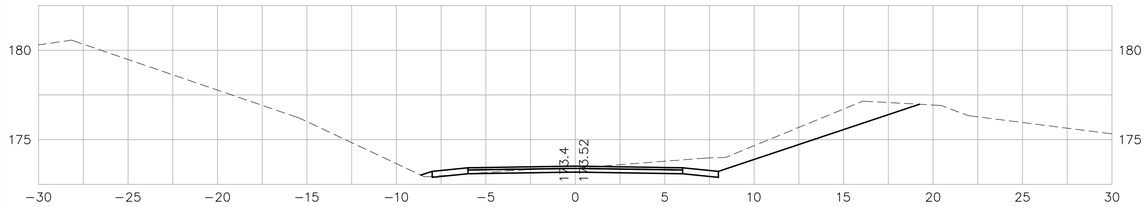
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

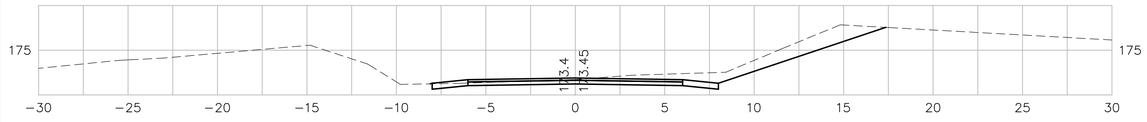
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	81	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

69+50

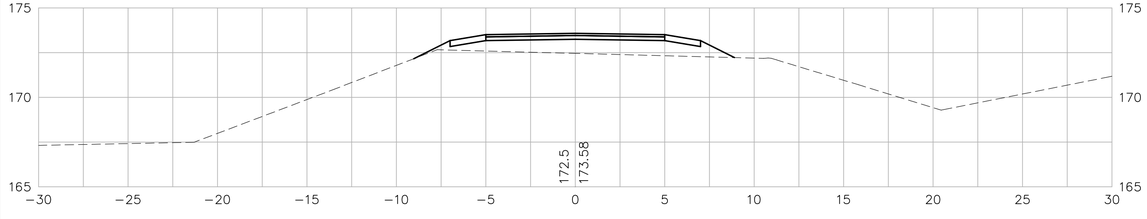


69+00

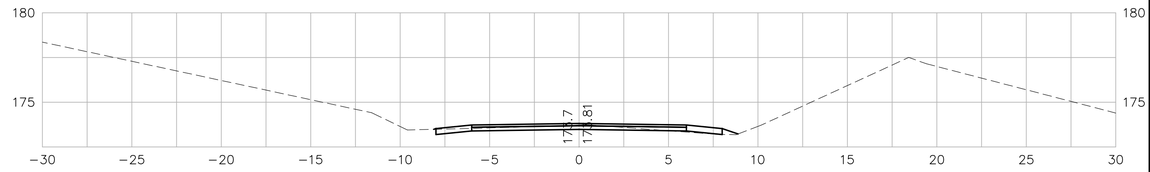


68+50

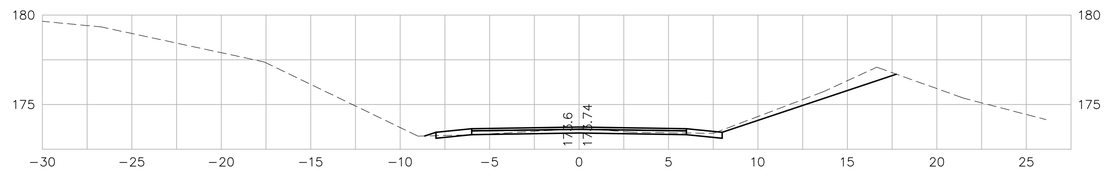
68+00



71+50



71+00



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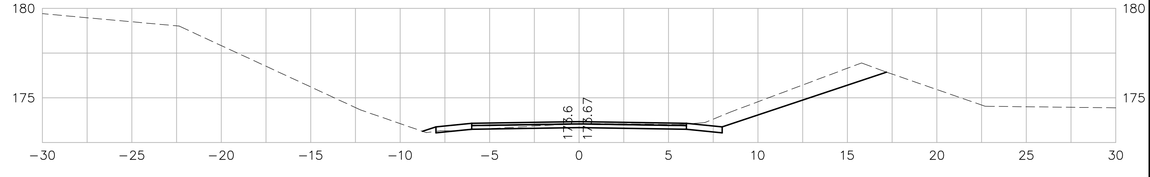

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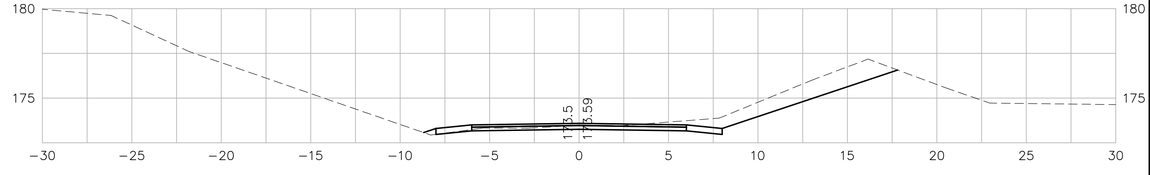


GRAPHIC SCALE

0 2 4 6 8 12 FEET

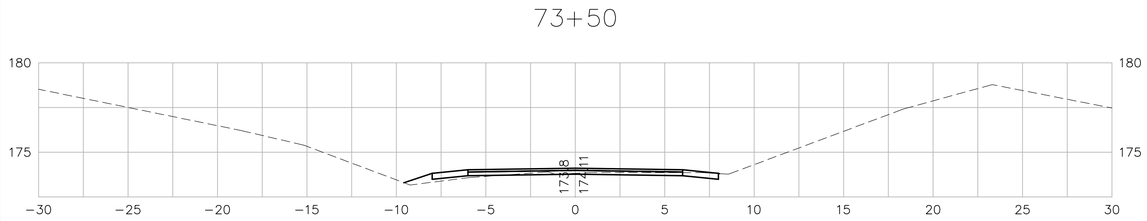
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

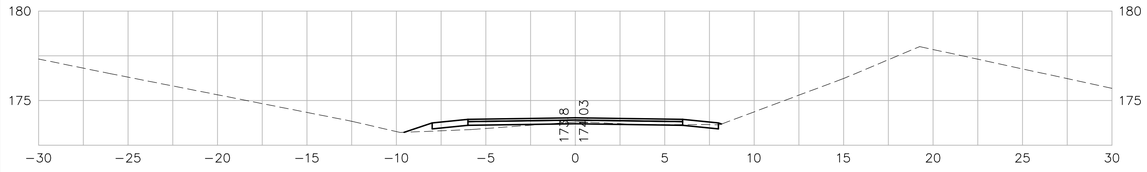
WESTFORD, CARLISLE & ACTON

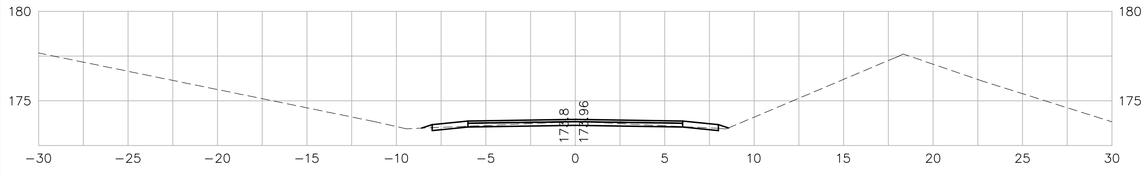
BRUCE FREEMAN RAIL TRAIL PHASE 2A

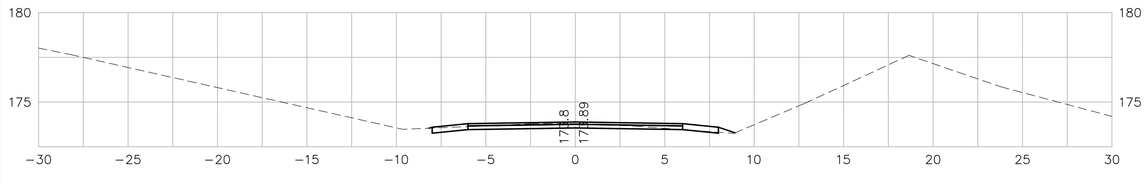
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	82	137
PROJECT FILE NO. 604532				

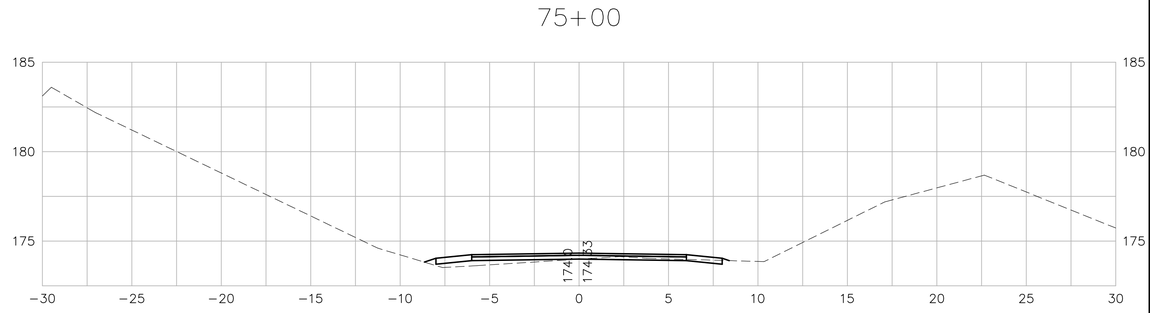
CROSS SECTIONS

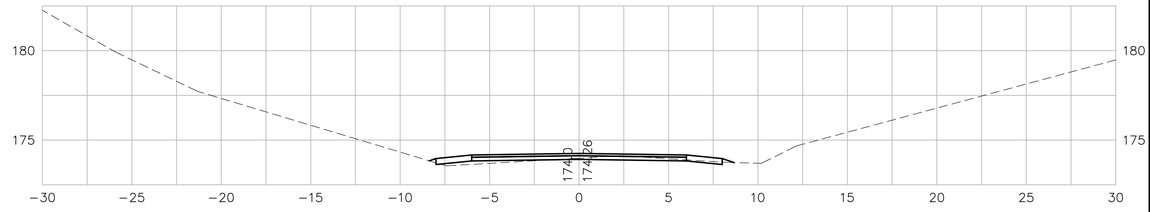


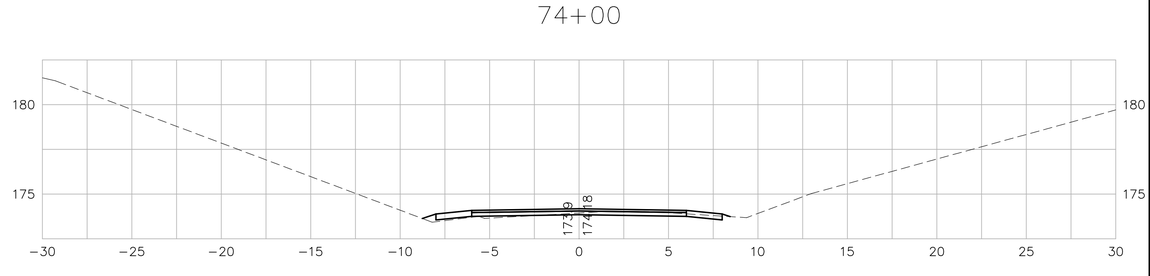












GRAPHIC SCALE

0 2 4 6 8 12 FEET

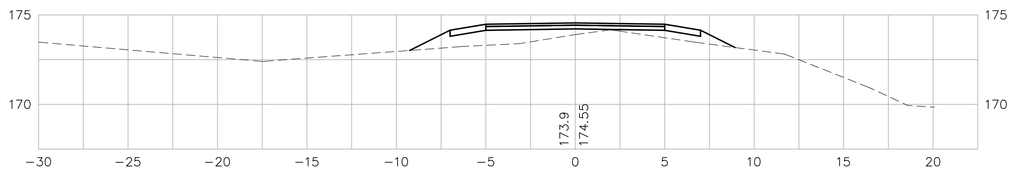
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

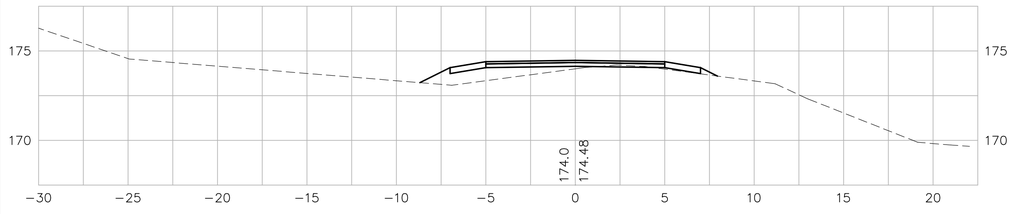
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	83	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

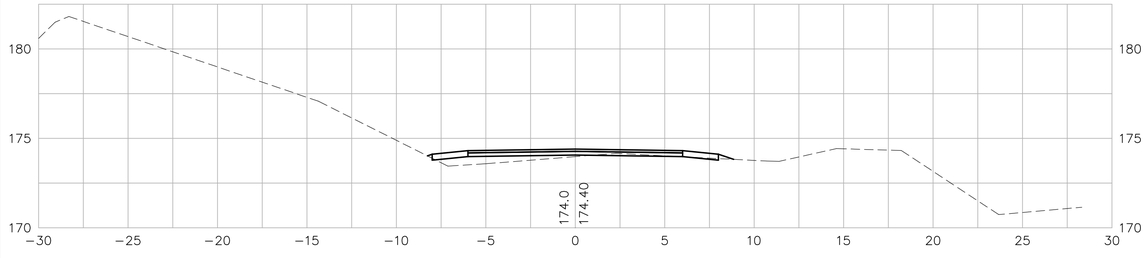
76+50



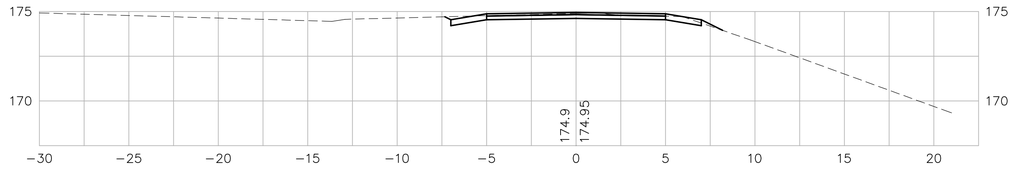
76+00



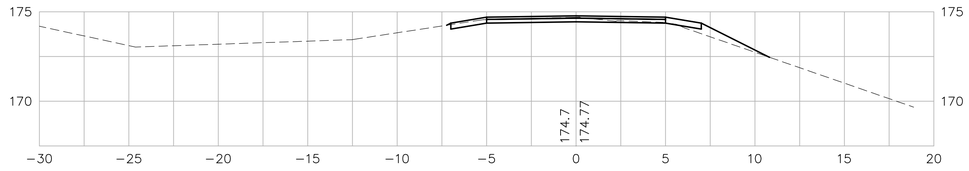
75+50



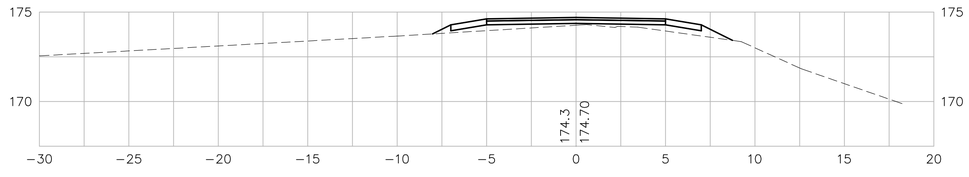
78+50



78+00



77+50



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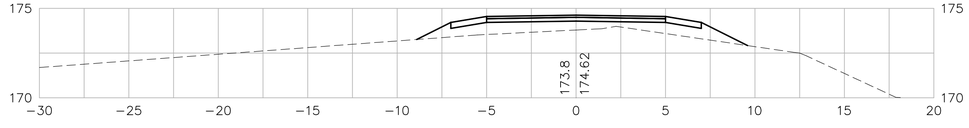


GRAPHIC SCALE
0 2 4 6 8 12 FEET

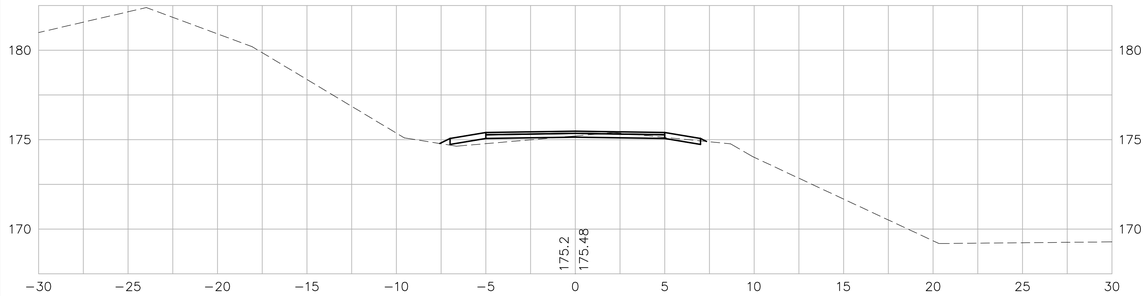
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

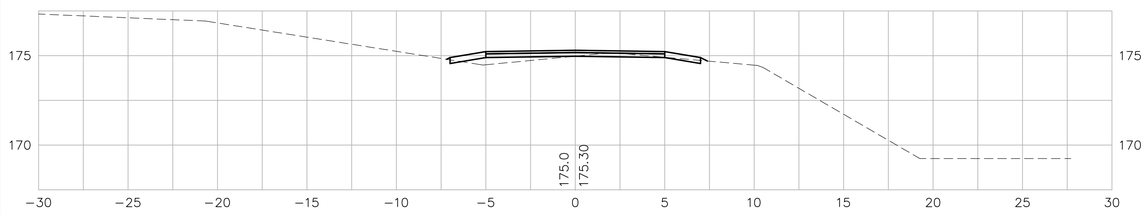
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	84	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

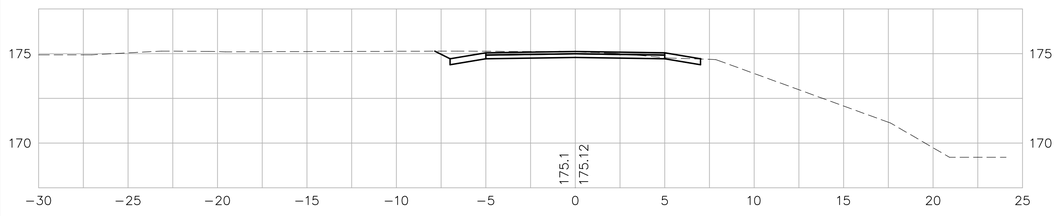
80+00



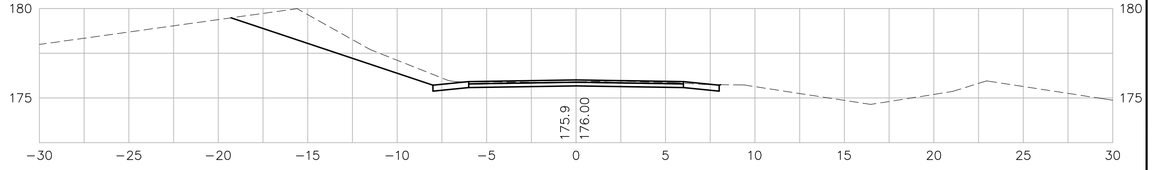
79+50



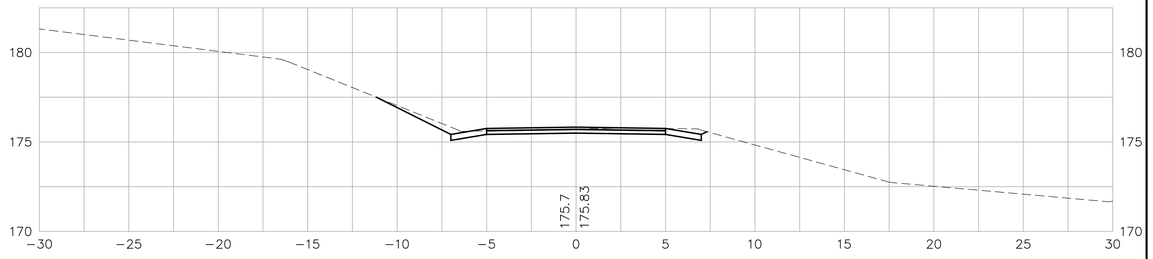
79+00



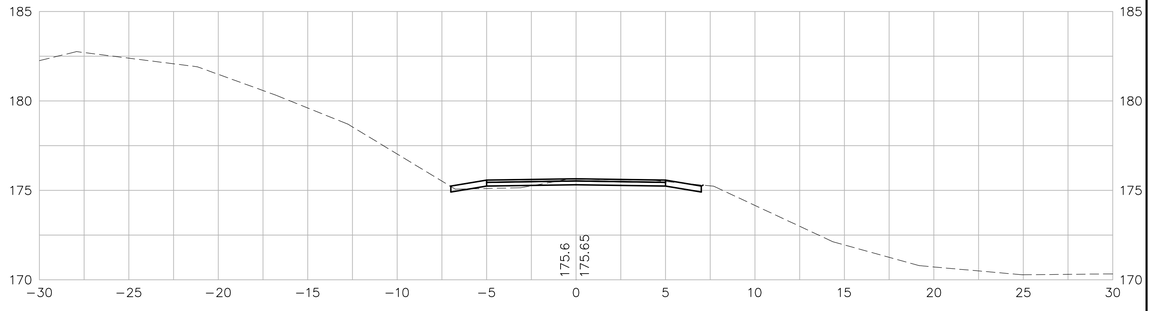
81+50



81+00



80+50



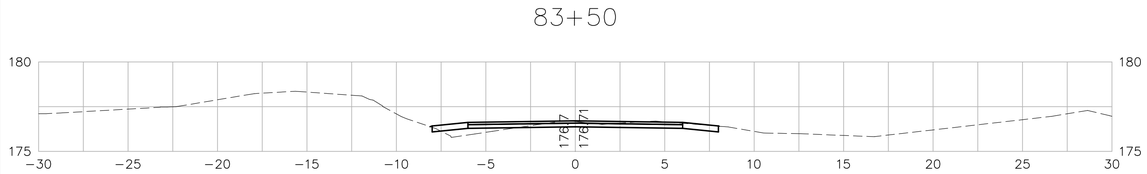
GRAPHIC SCALE
0 2 4 6 8 12 FEET

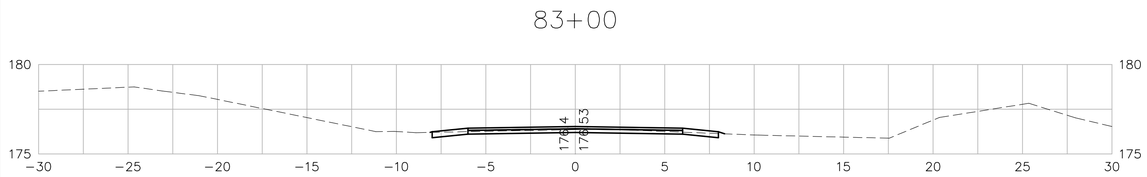
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

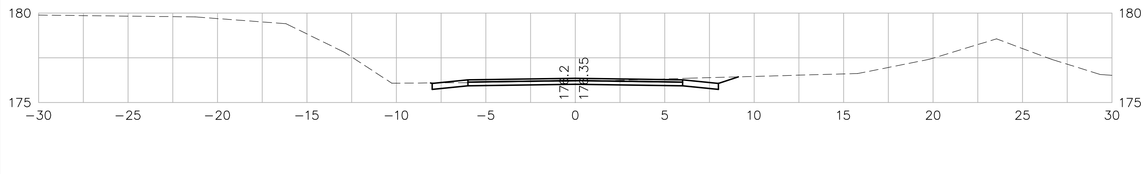
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

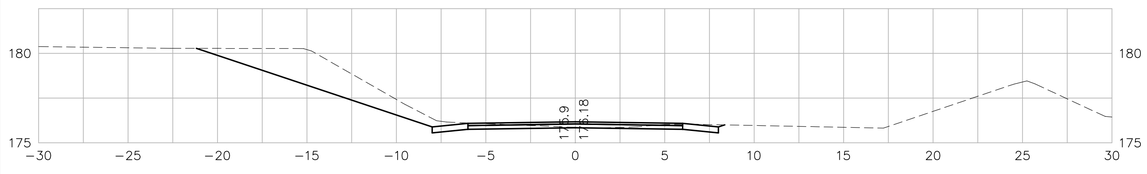
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	85	137
PROJECT FILE NO. 604532				

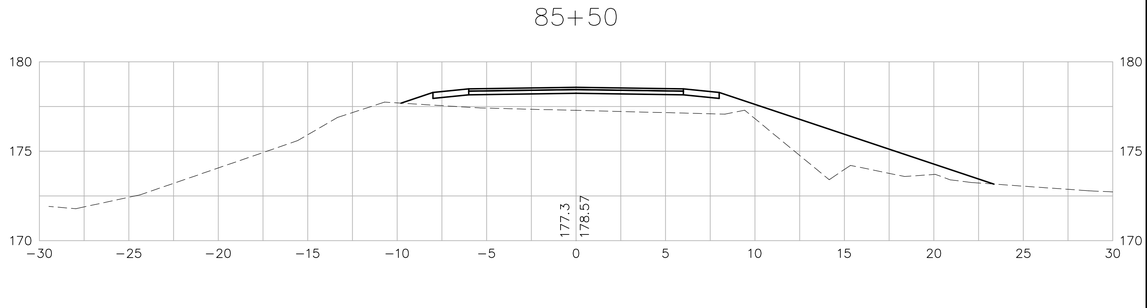
CROSS SECTIONS

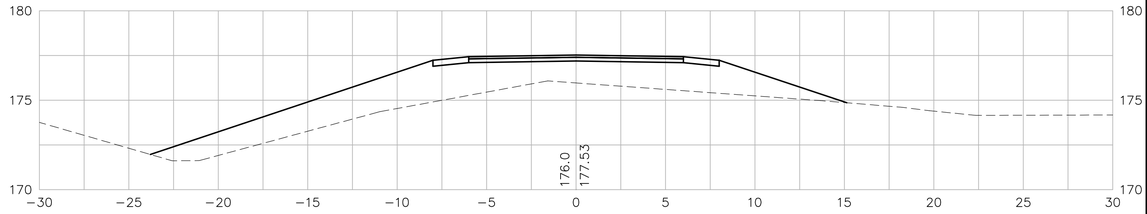


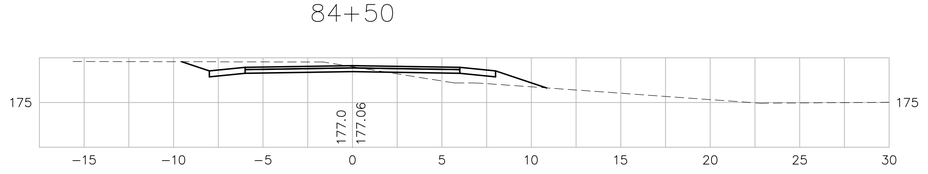


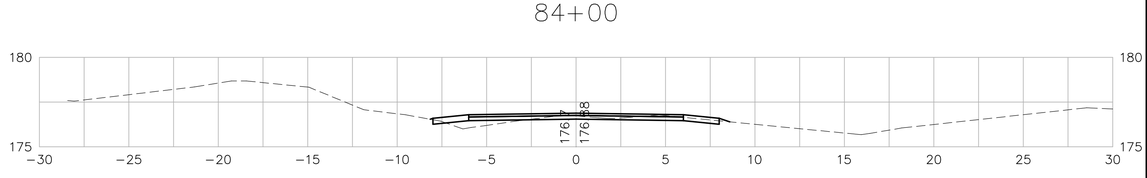












GRAPHIC SCALE
0 2 4 6 8 12 FEET

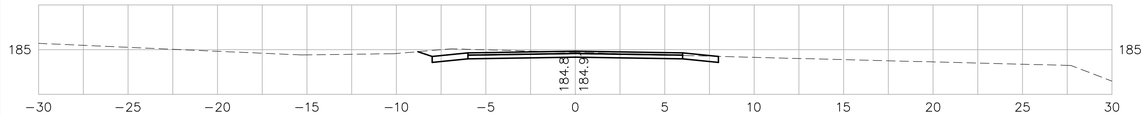
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

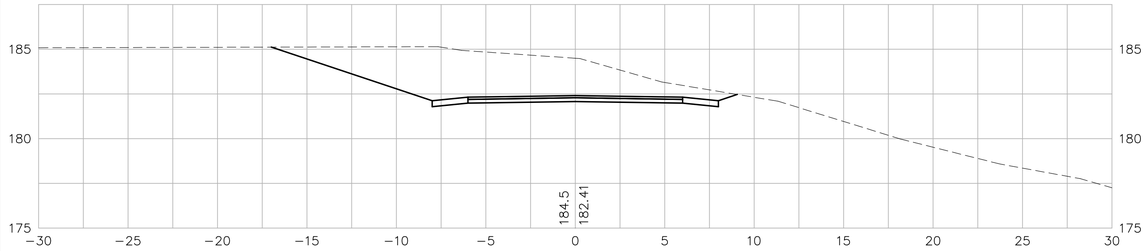
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	86	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

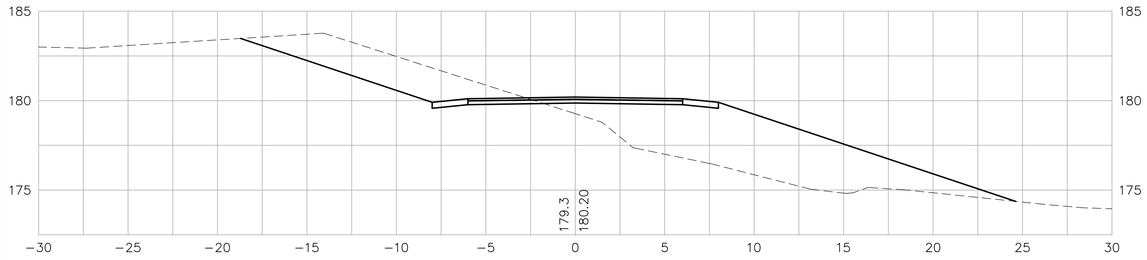
87+00



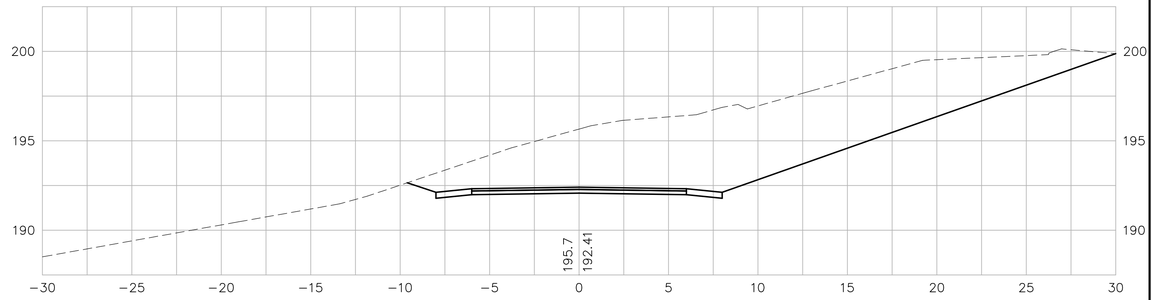
86+50



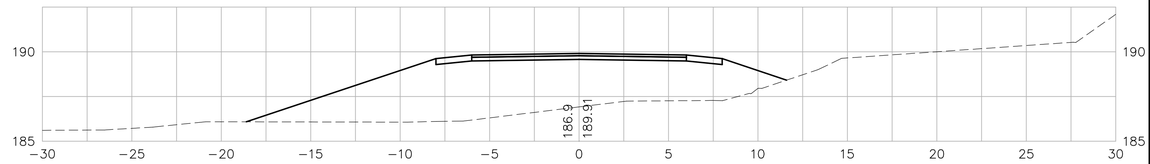
86+00



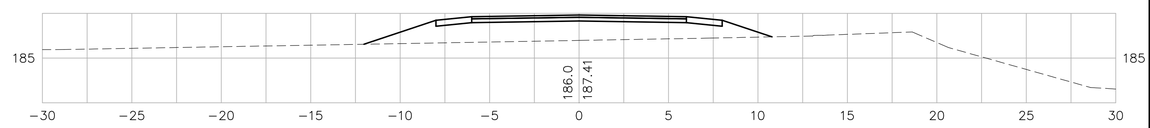
88+50



88+00



87+50



GRAPHIC SCALE

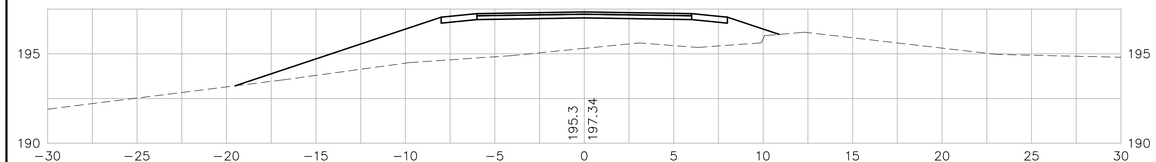
0 2 4 6 8 12 FEET

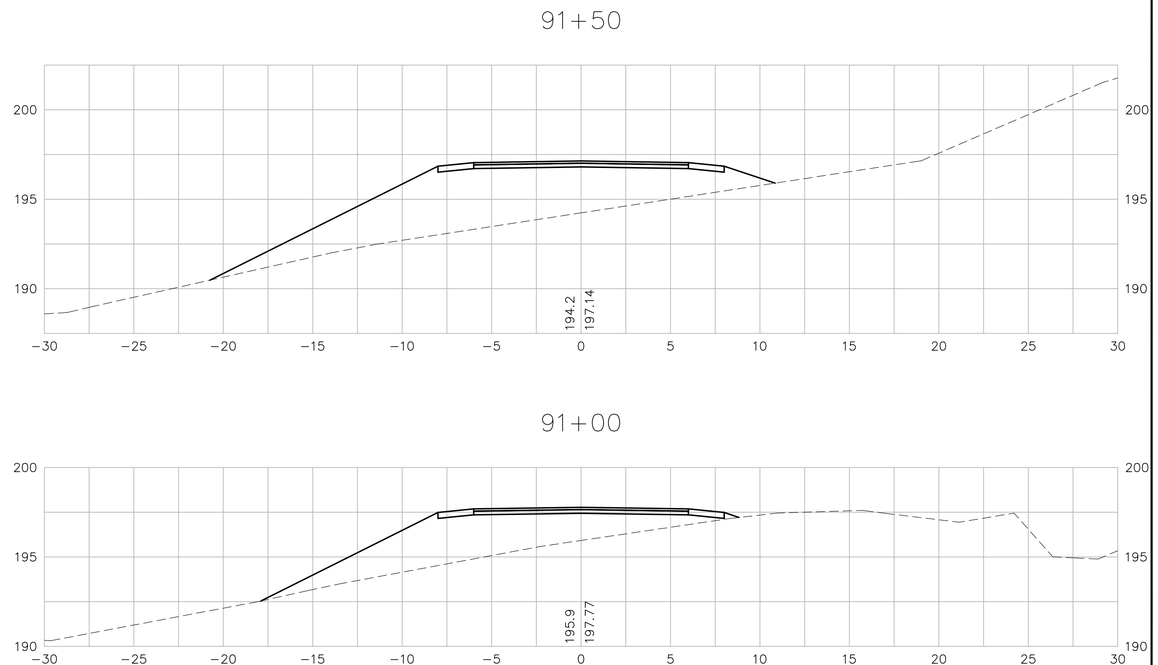
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

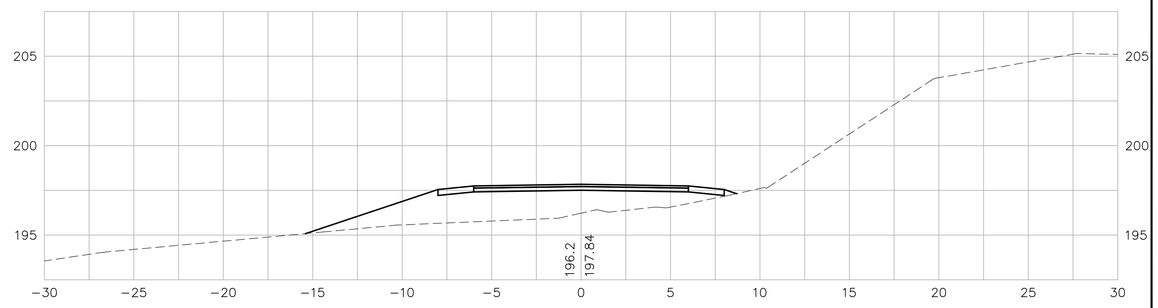
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	87	137
PROJECT FILE NO. 604532				

CROSS SECTIONS







GRAPHIC SCALE
0 2 4 6 8 12 FEET

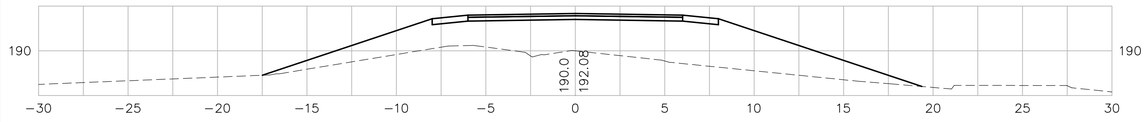
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

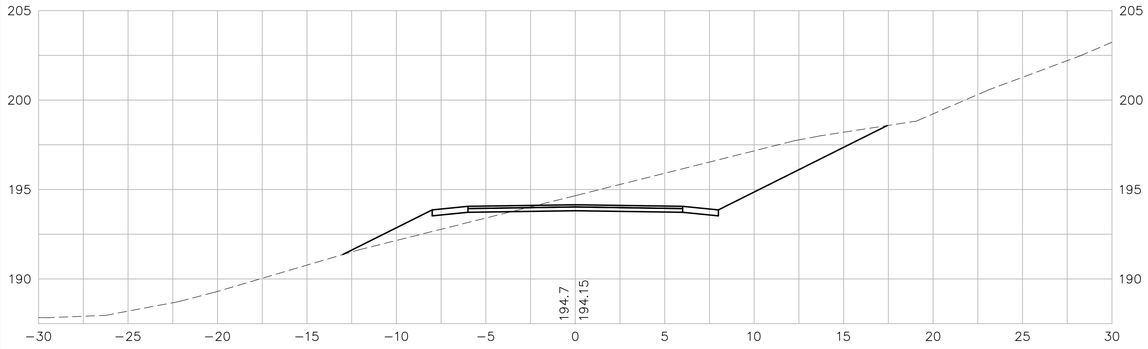
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	88	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

93+00



92+50



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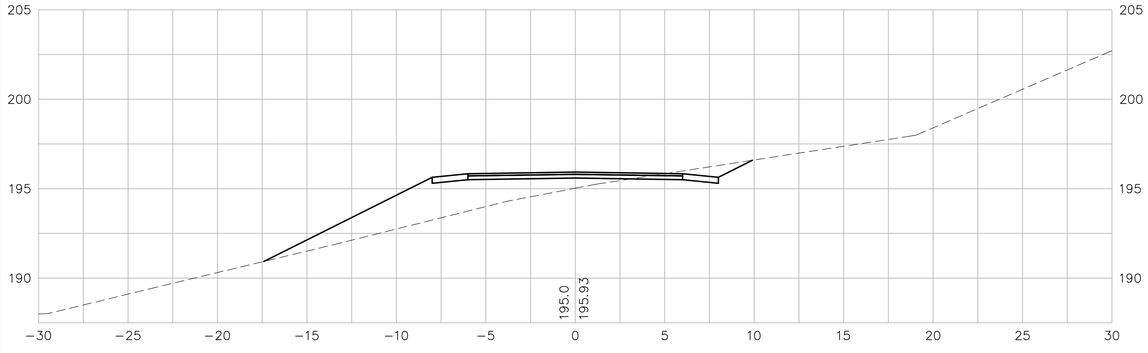
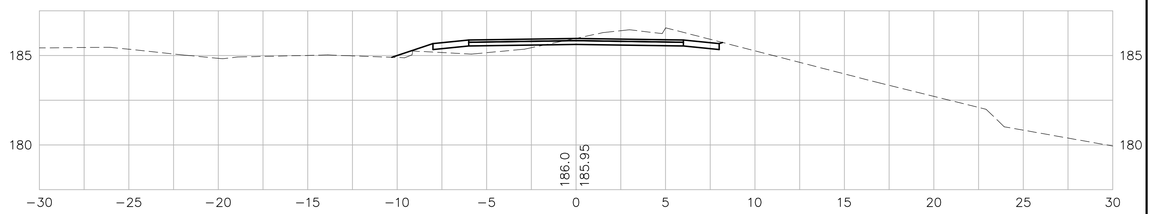


95+00



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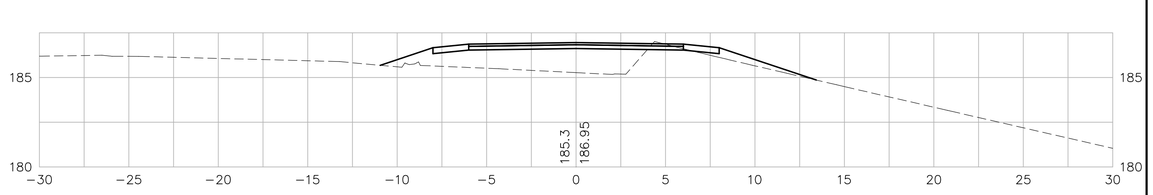

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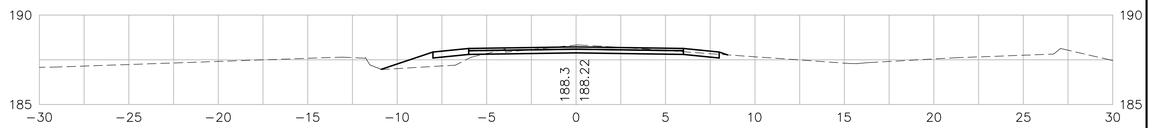

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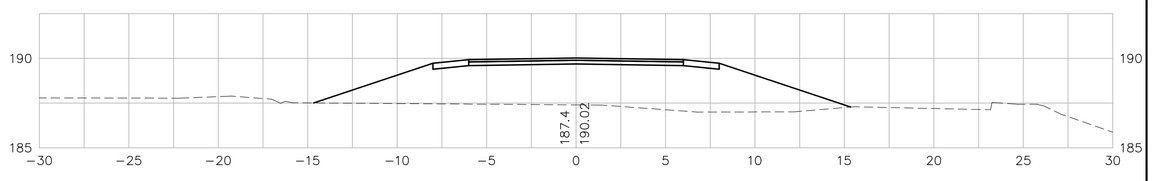


GRAPHIC SCALE
0 2 4 6 8 12 FEET

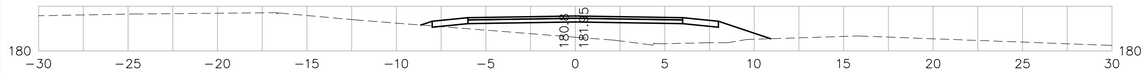
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	89	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

97+00



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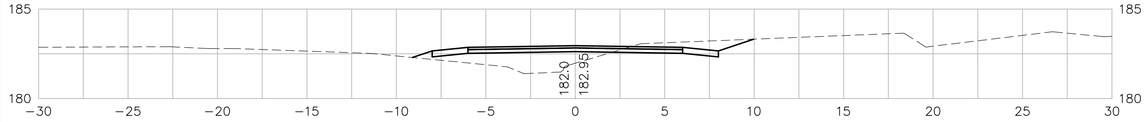

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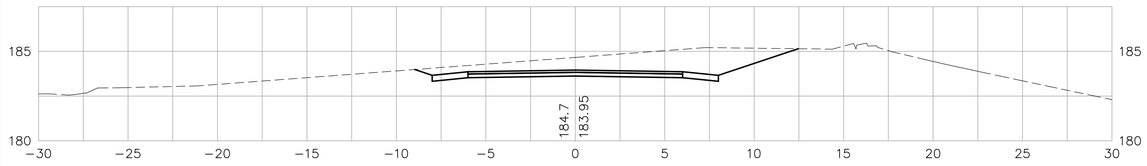

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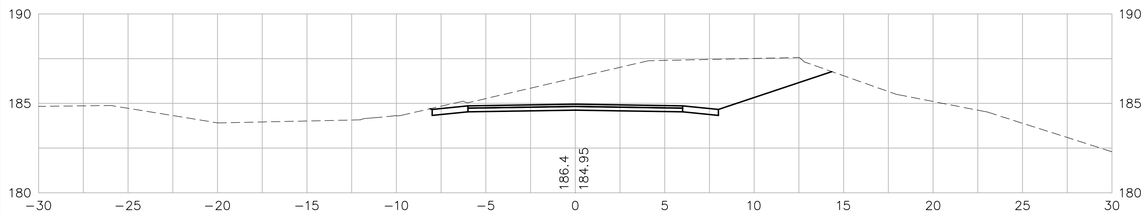

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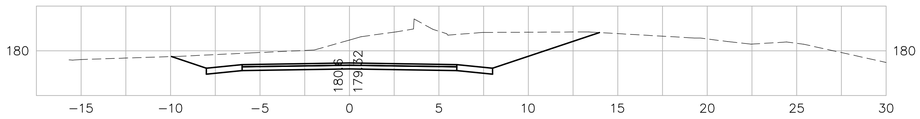

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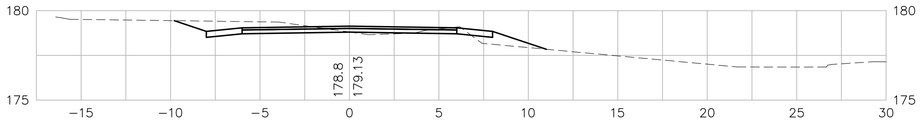

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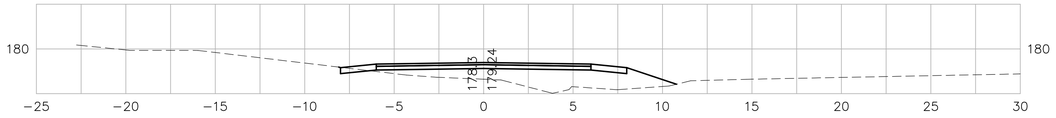
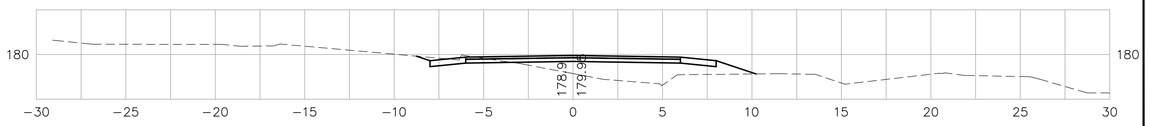
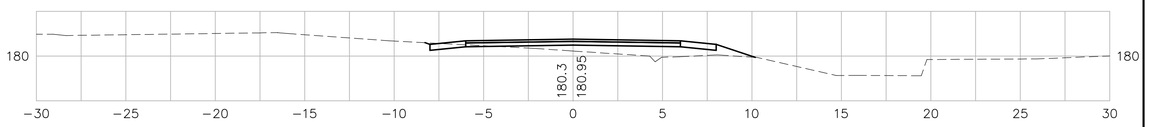


98+00



97+50



GRAPHIC SCALE
0 2 4 6 8 12 FEET

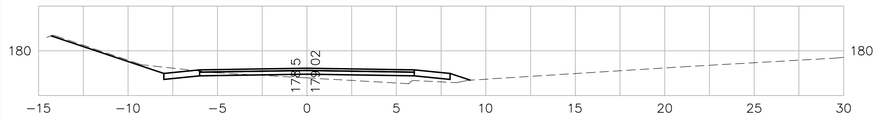
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

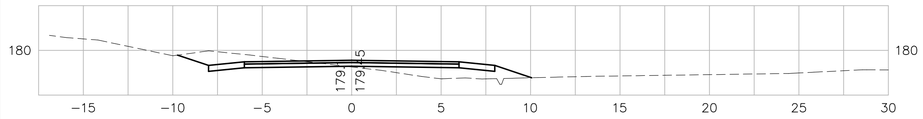
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	90	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

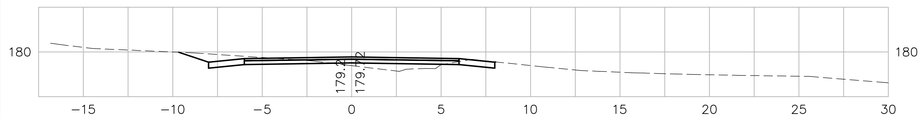
102+00



101+50



101+00



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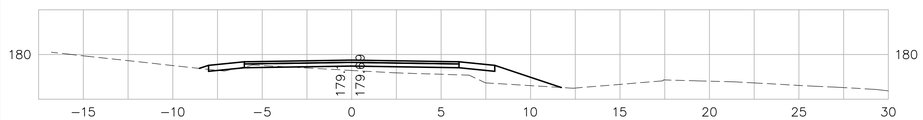
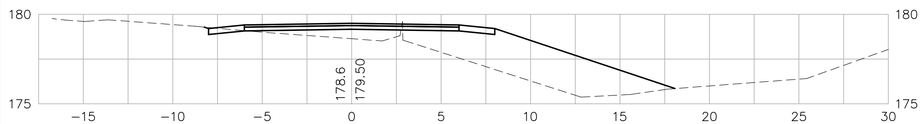
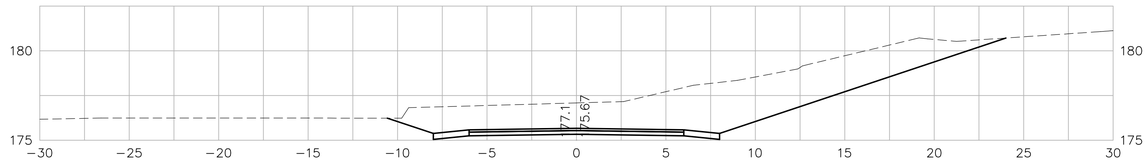


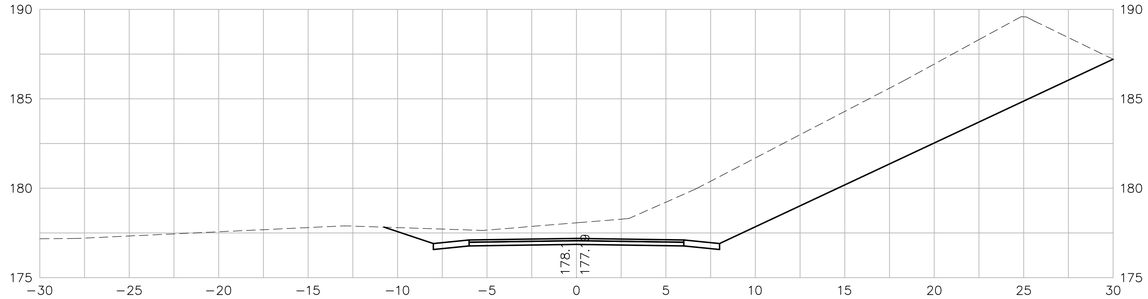
100+00



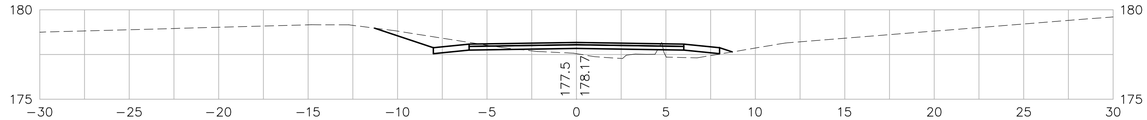
104+00



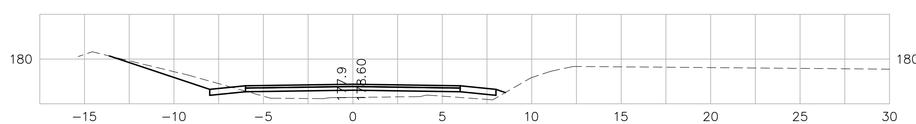
103+50



103+00



102+50



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

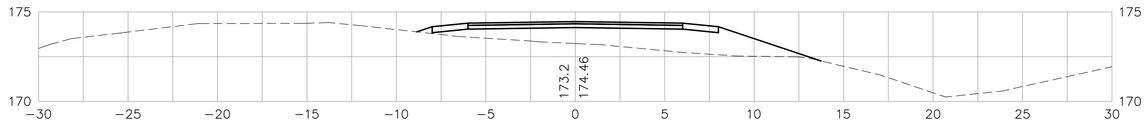
GRAPHIC SCALE
0 2 4 6 8 12 FEET

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

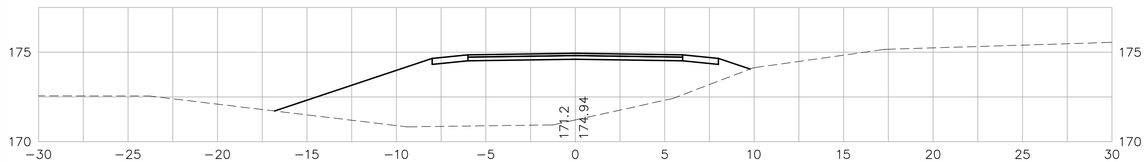
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	91	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

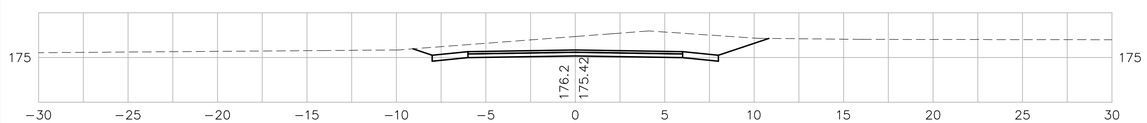
106+00



105+50



105+00



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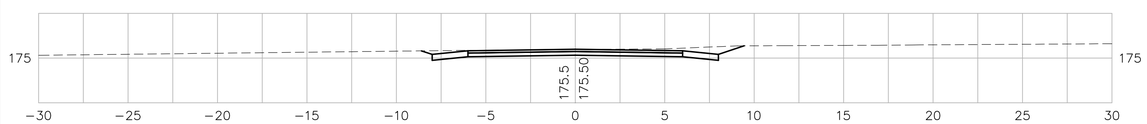
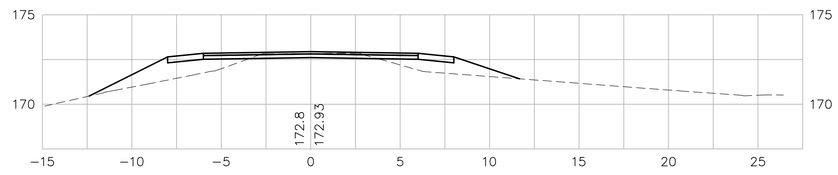
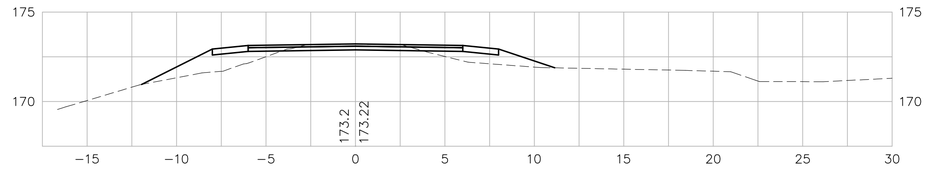


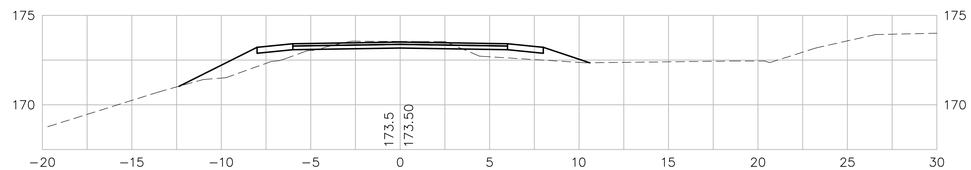
108+00



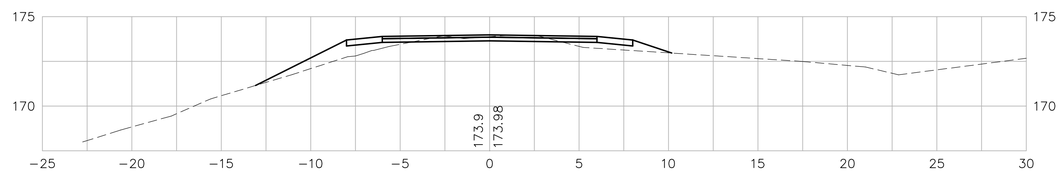
107+50



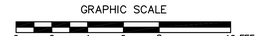
107+00



106+50



GRAPHIC SCALE



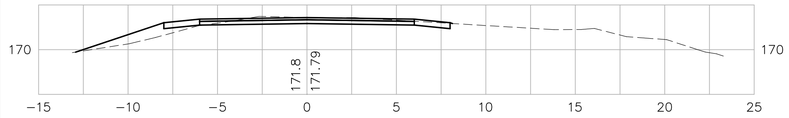
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

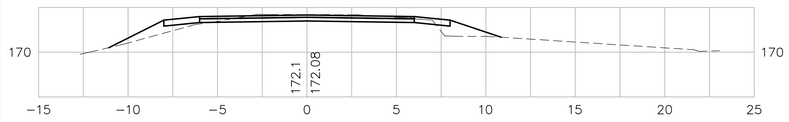
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	92	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

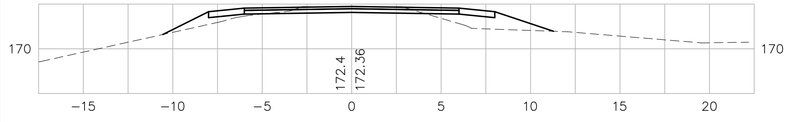
110+00



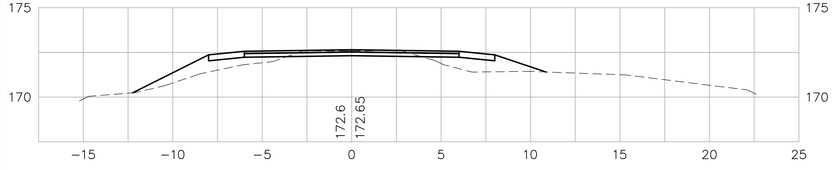
109+50



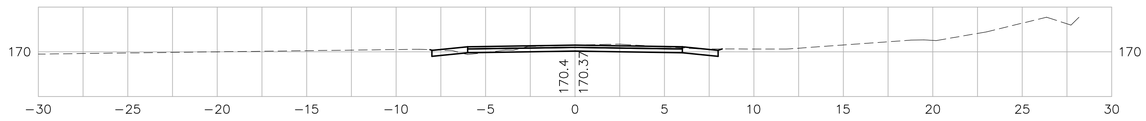
109+00



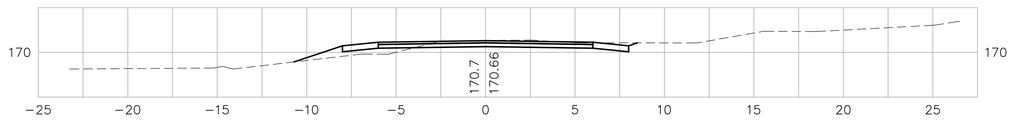
108+50



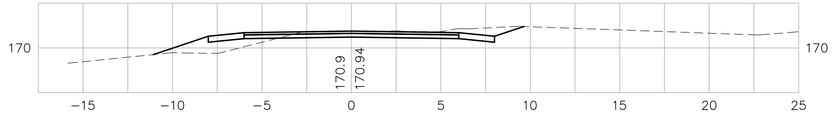
112+50



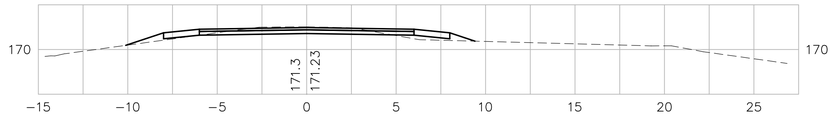
112+00



111+50



111+00



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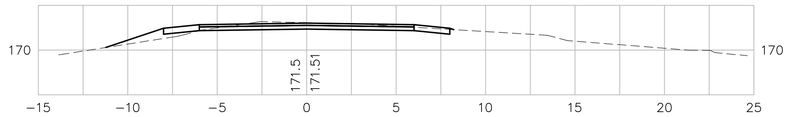


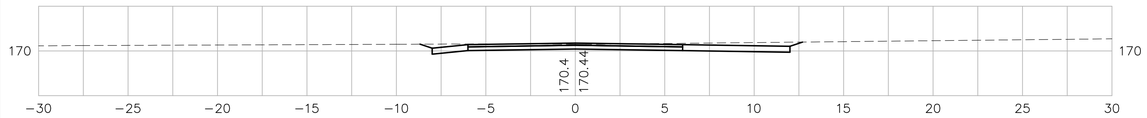
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

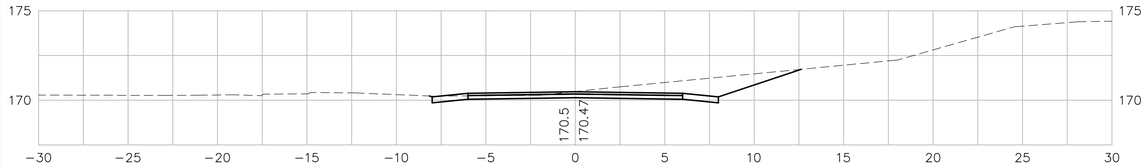
GRAPHIC SCALE
0 2 4 6 8 12 FEET

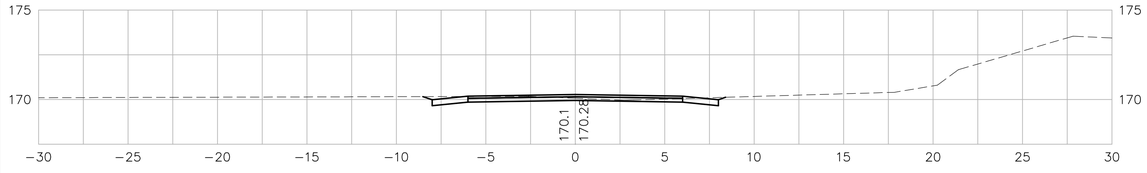
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

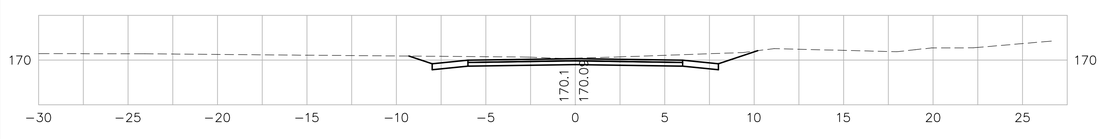
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	93	137
PROJECT FILE NO. 604532				

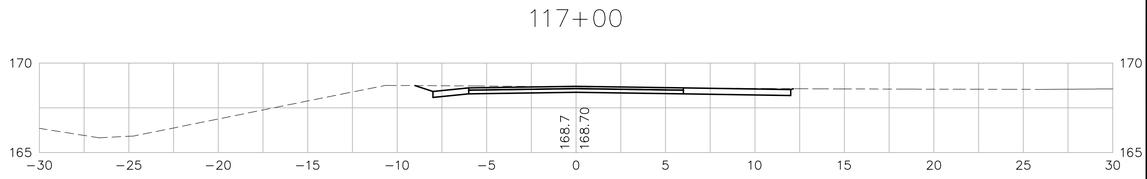
CROSS SECTIONS

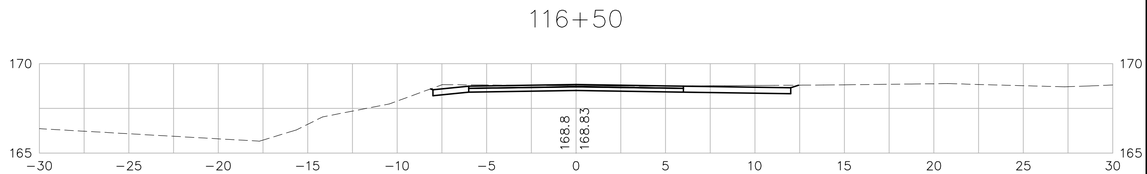


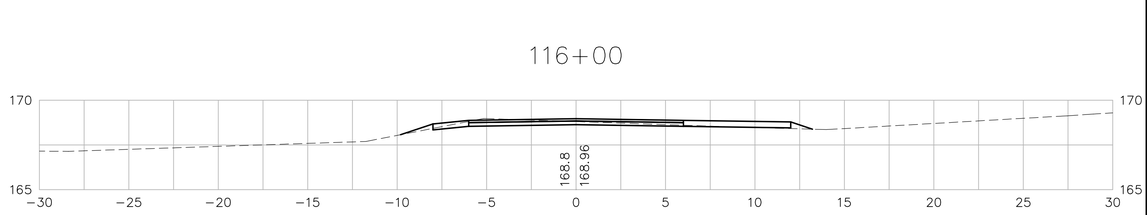


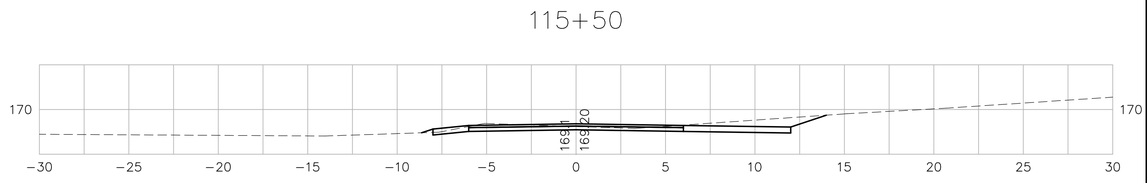


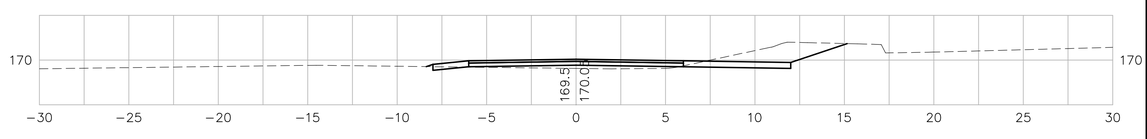












GRAPHIC SCALE
0 2 4 6 8 12 FEET

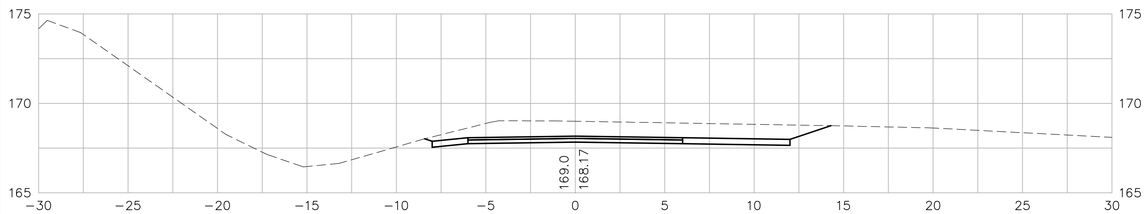
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

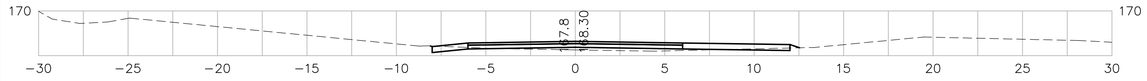
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	94	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

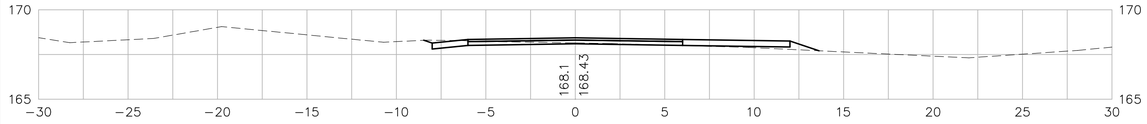
119+00



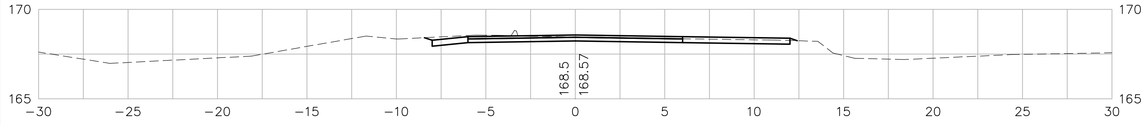
118+50



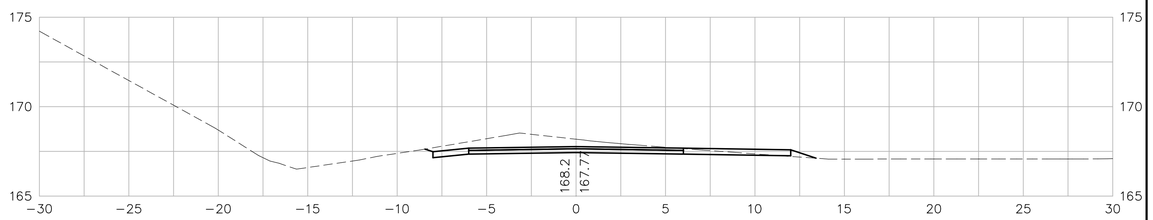
118+00



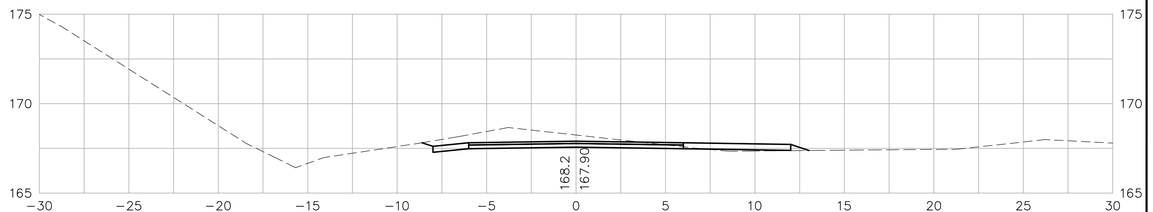
117+50



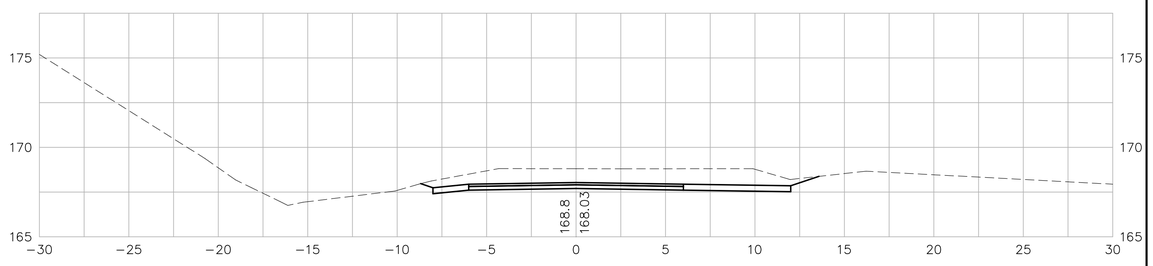
120+50



120+00



119+50



GRAPHIC SCALE
0 2 4 6 8 12 FEET

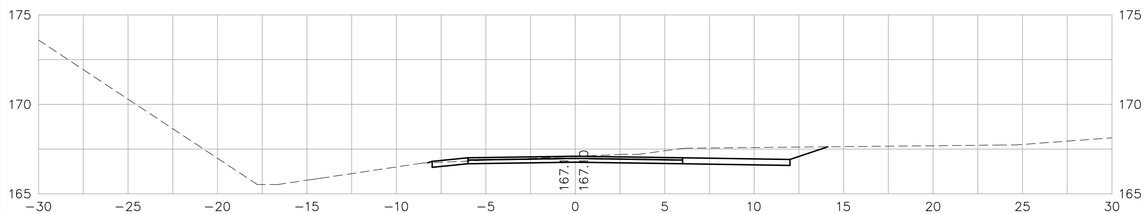
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

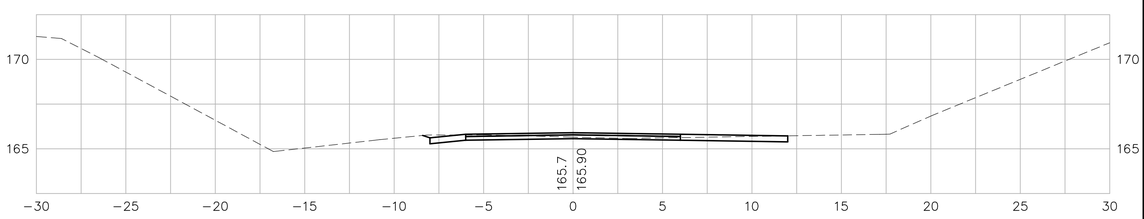
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	95	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

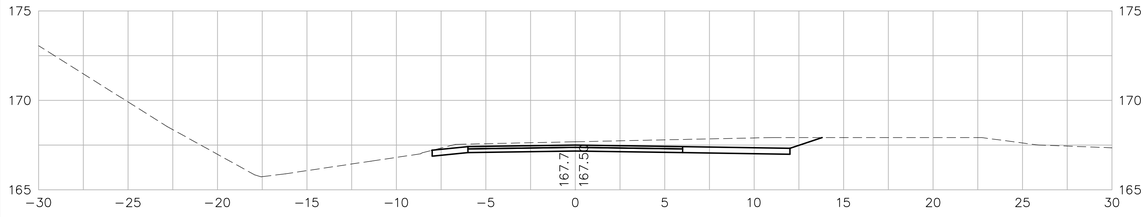
122+00



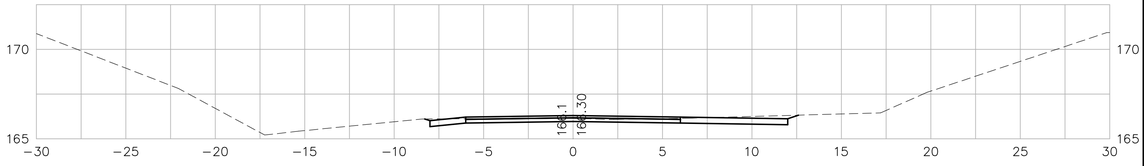
123+50



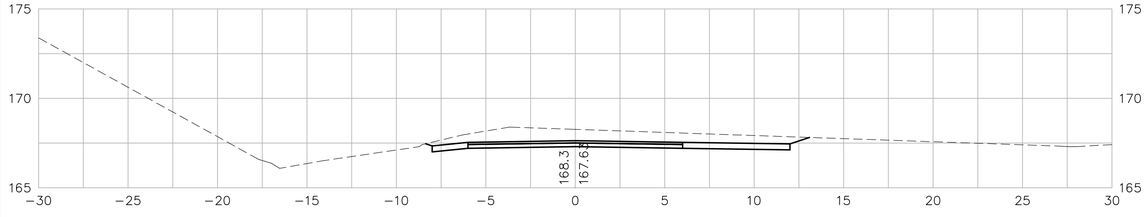
121+50



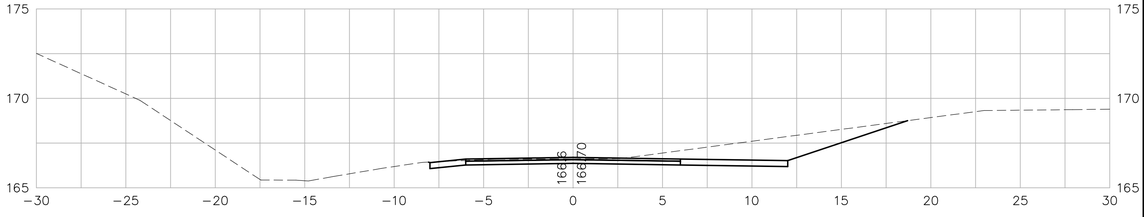
123+00



121+00



122+50



GRAPHIC SCALE
0 2 4 6 8 12 FEET

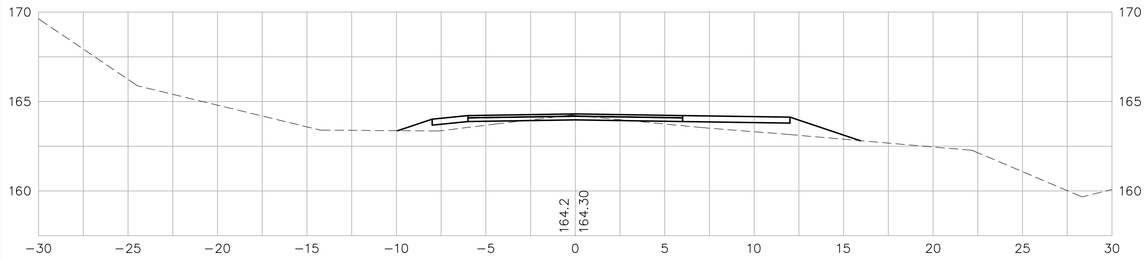
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

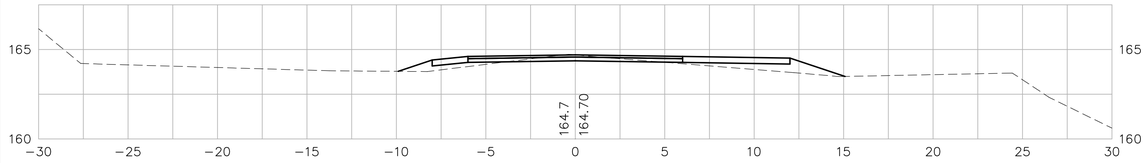
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	96	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

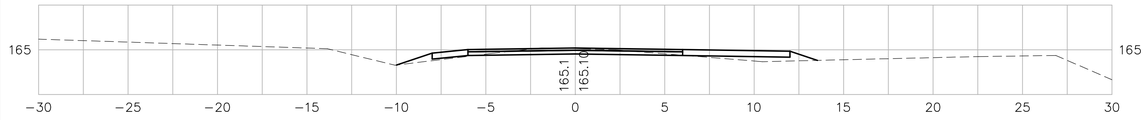
125+50



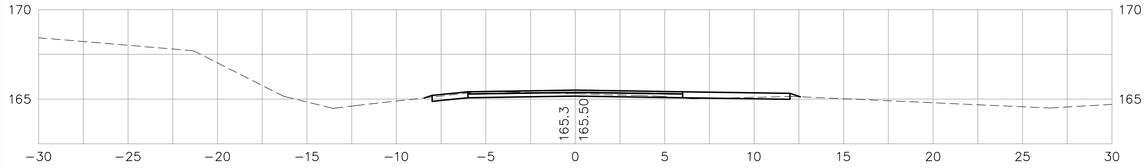
125+00



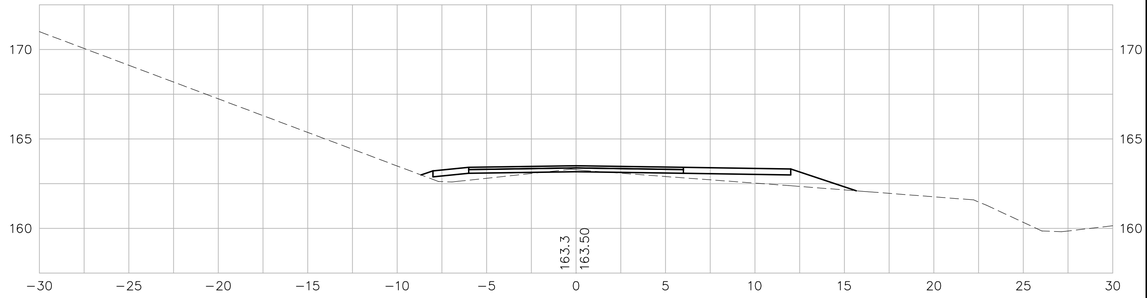
124+50



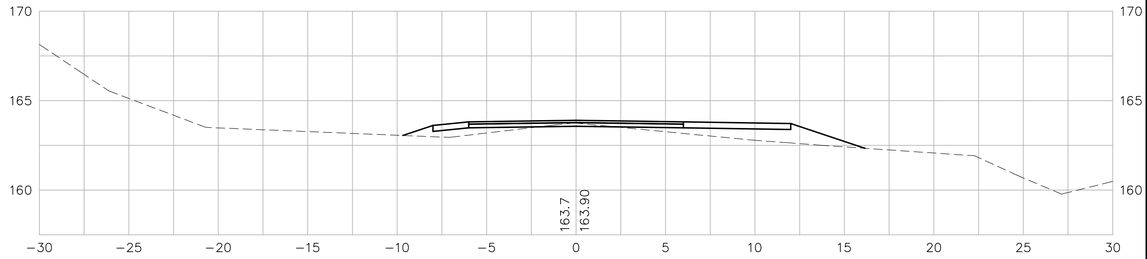
124+00



126+50



126+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

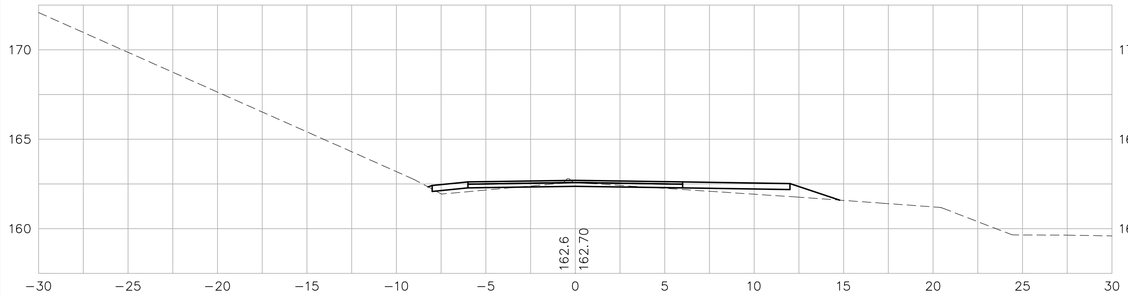
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

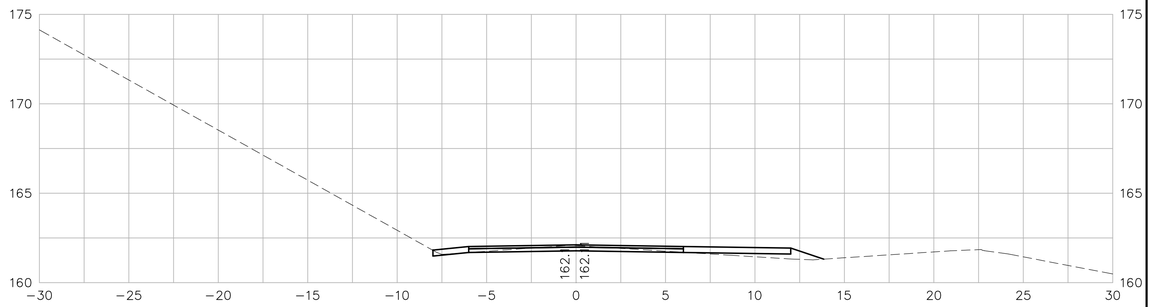
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	97	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

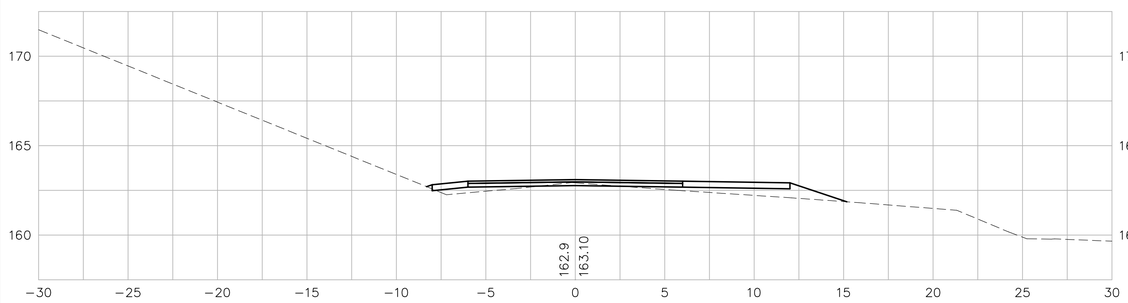
127+50



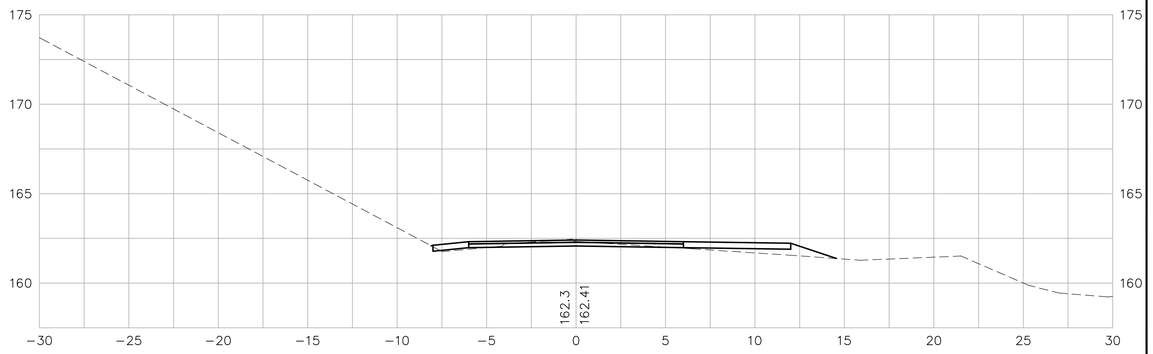
128+50



127+00



128+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

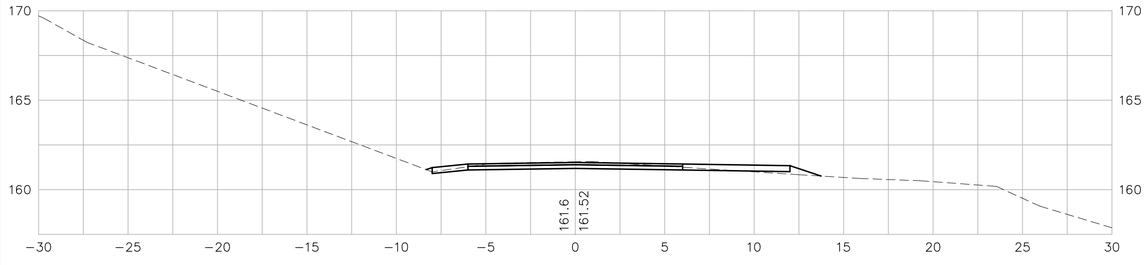
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

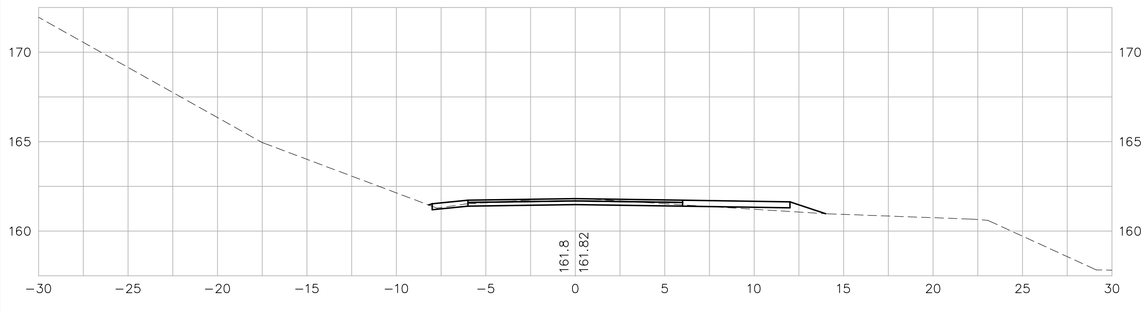
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	98	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

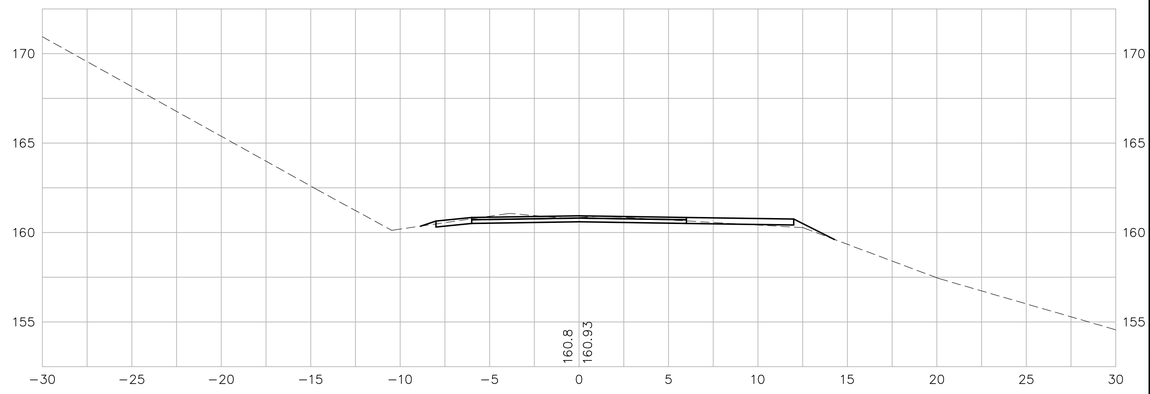
129+50



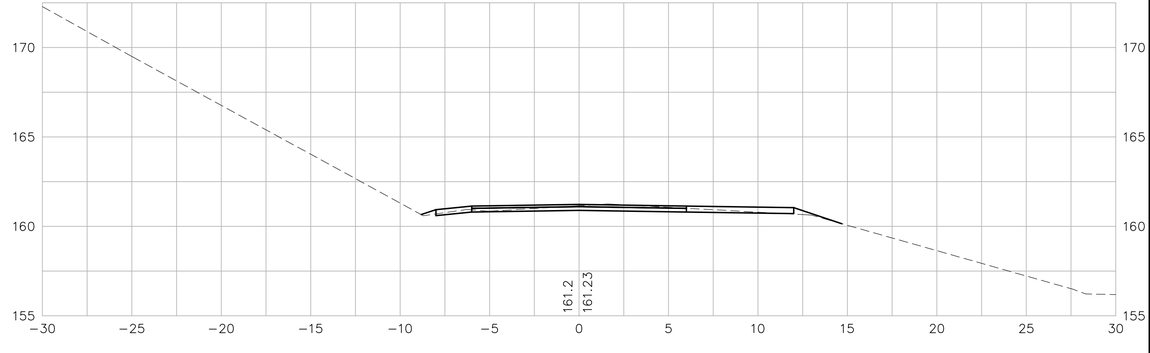
129+00



130+50



130+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

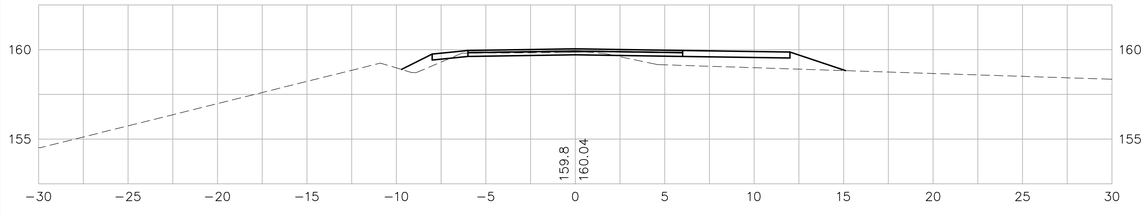
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

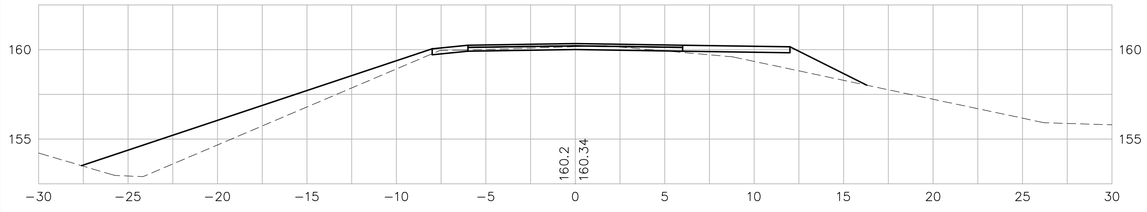
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	99	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

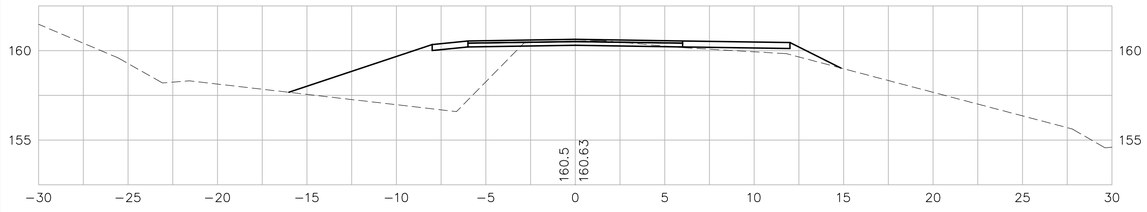
132+00



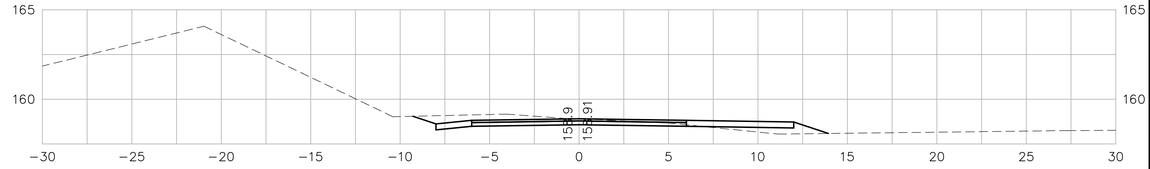
131+50



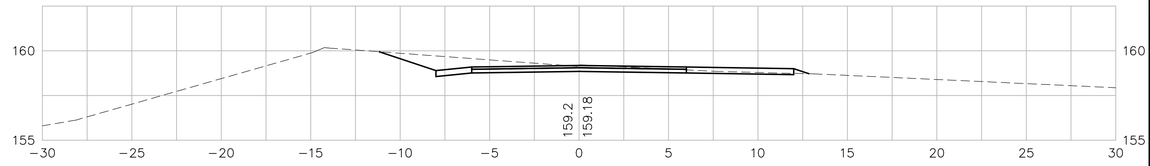
131+00



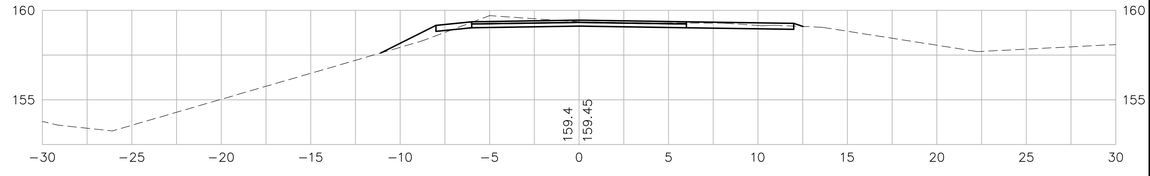
134+00



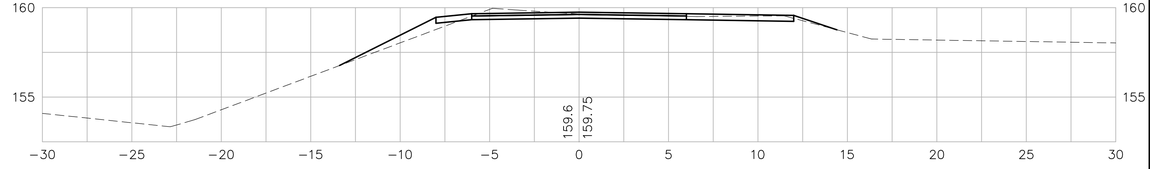
133+50



133+00



132+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

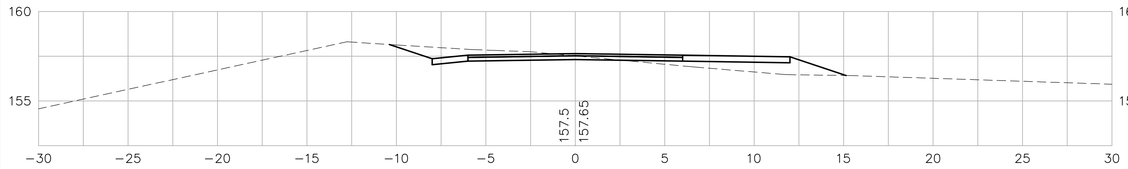
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

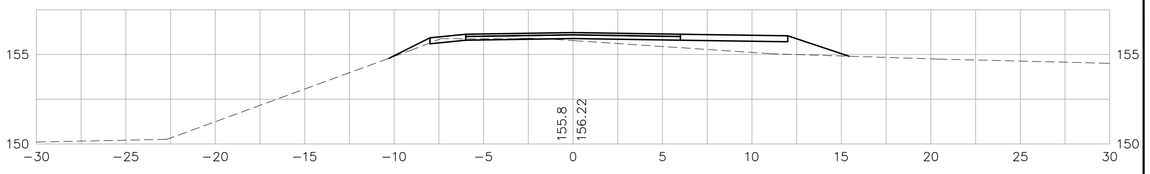
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	100	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

136+00



138+00



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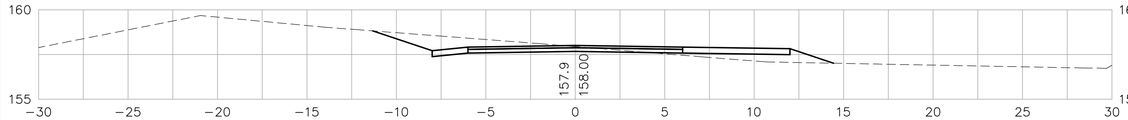
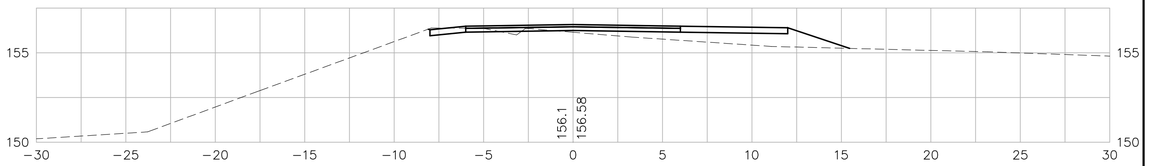
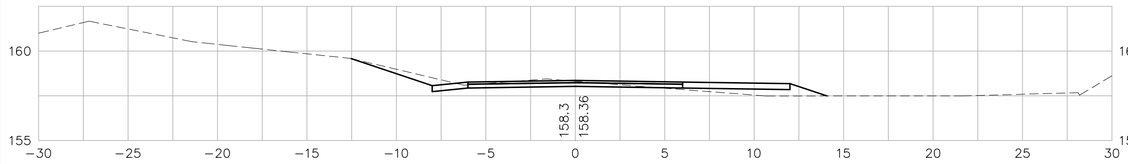


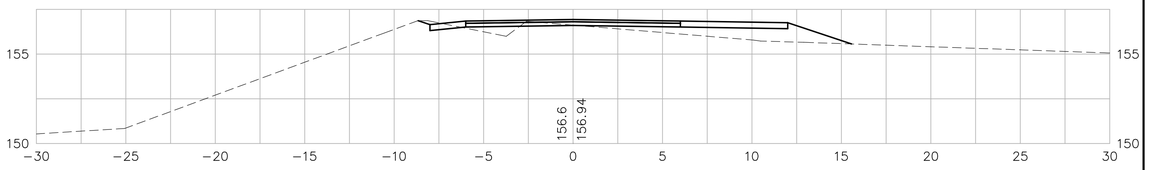
137+50



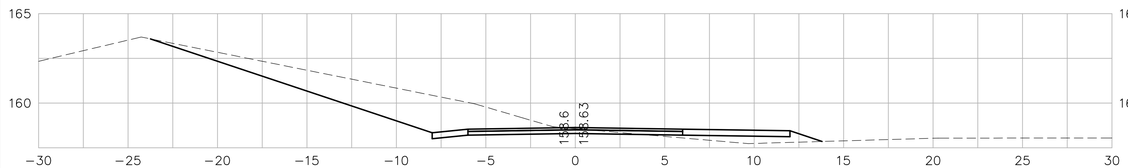
135+00



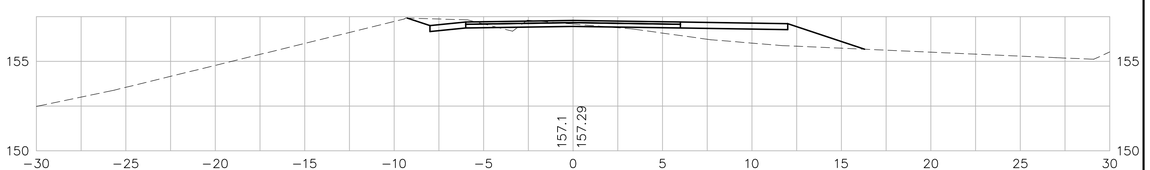
137+00



134+50



136+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

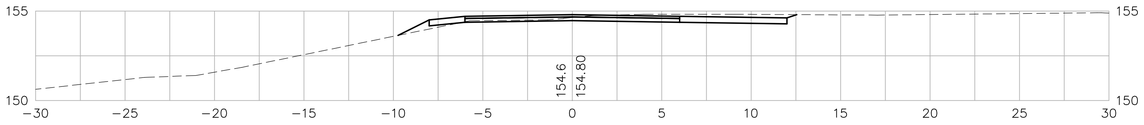
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

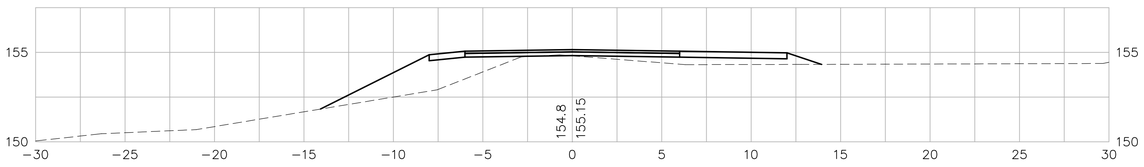
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	101	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

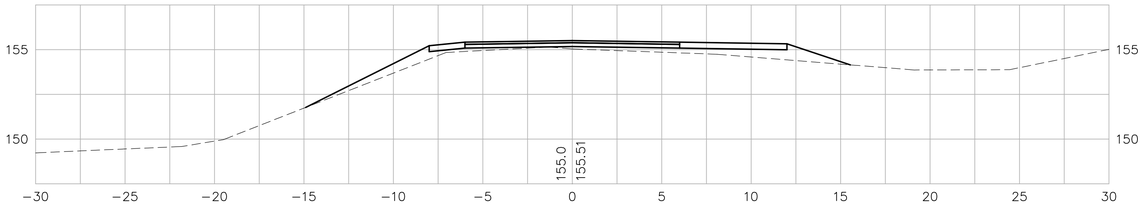
140+00



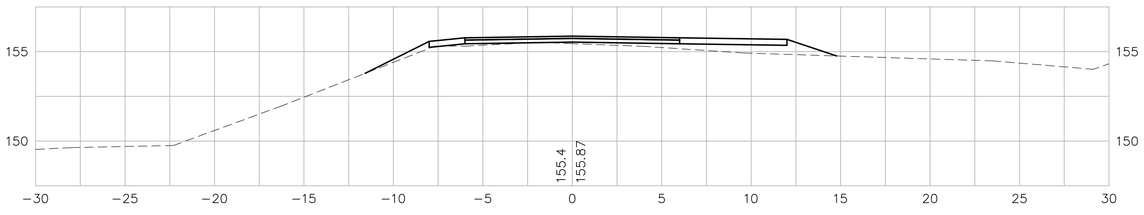
139+50



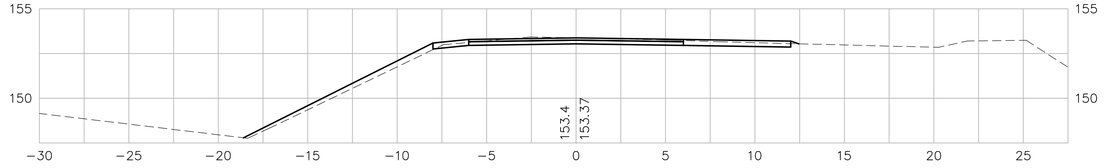
139+00



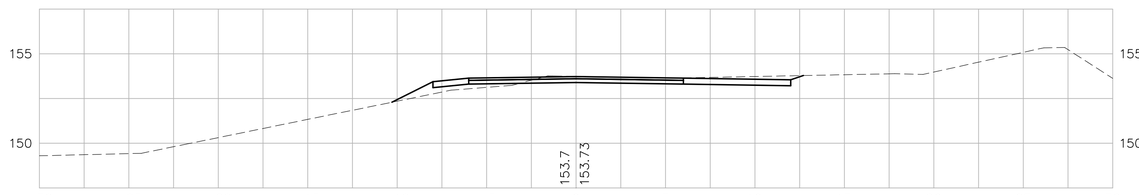
138+50



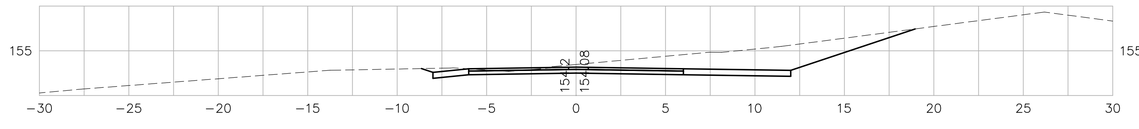
142+00



141+50



141+00



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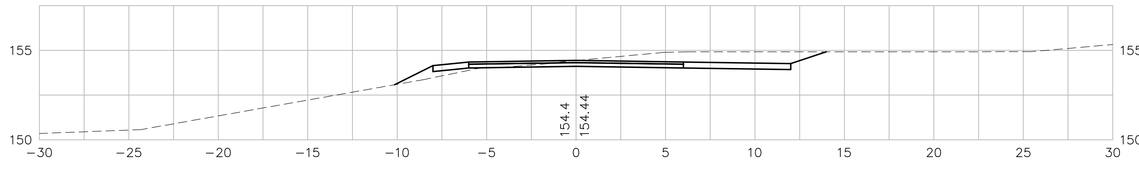


GRAPHIC SCALE
0 2 4 6 8 12 FEET

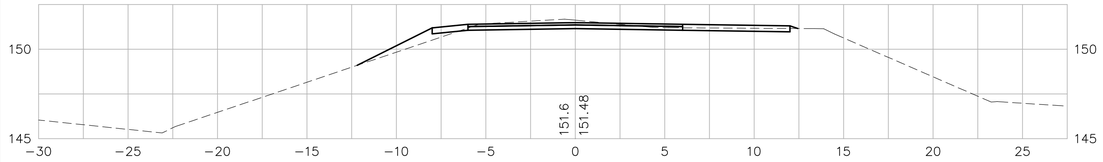
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

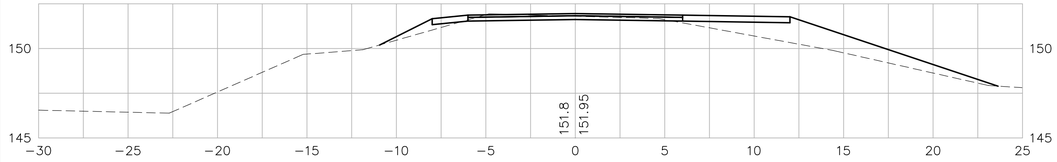
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	102	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

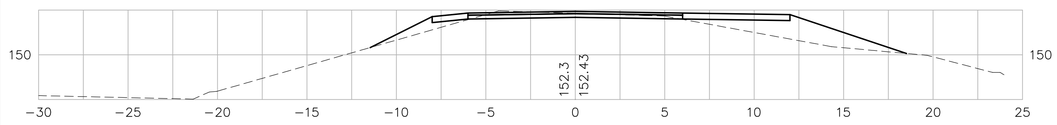
144+00



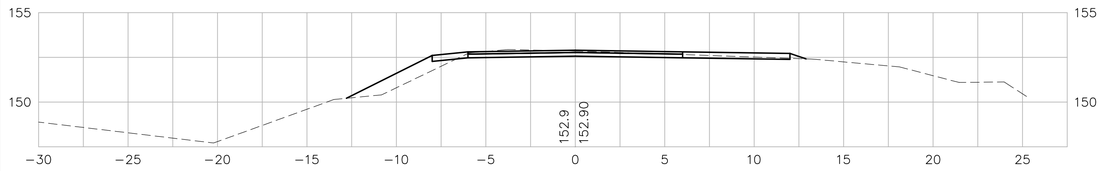
143+50



143+00



142+50



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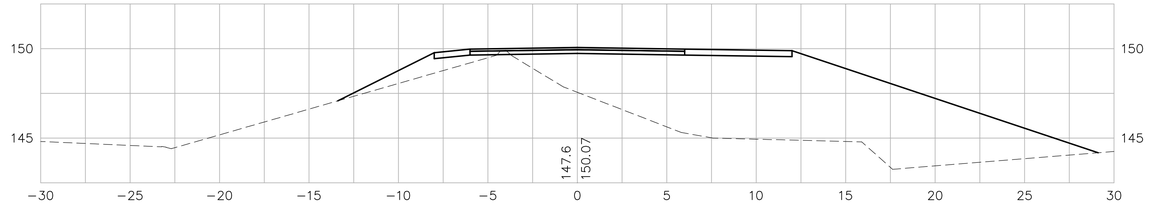
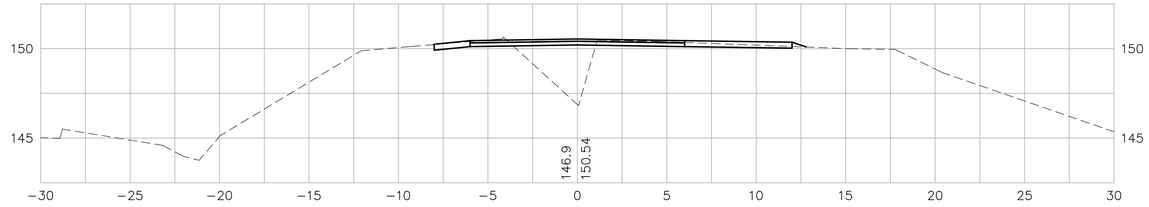


145+00



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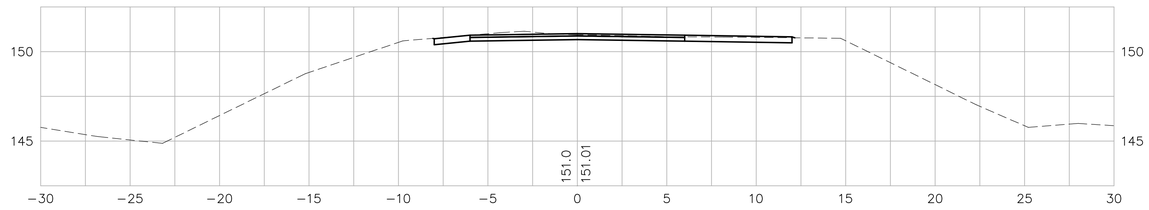


GRAPHIC SCALE
0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

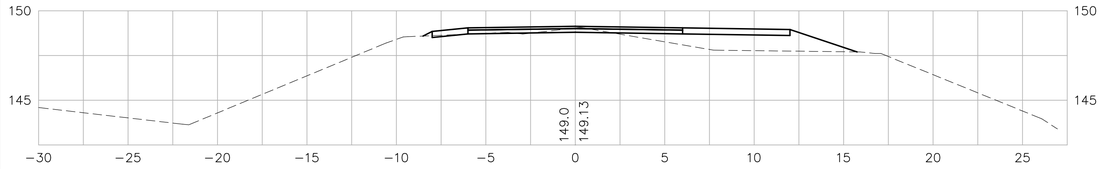
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

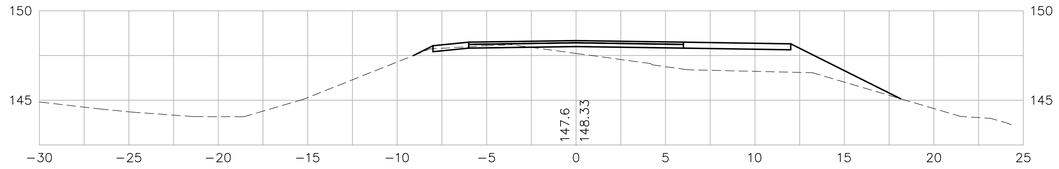
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	103	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

147+50



149+50



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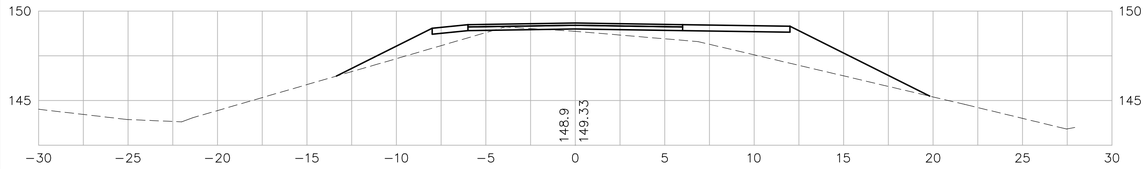
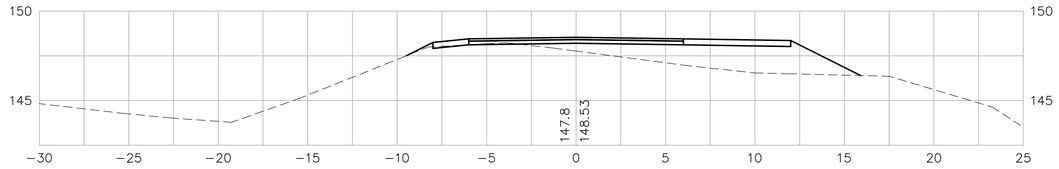
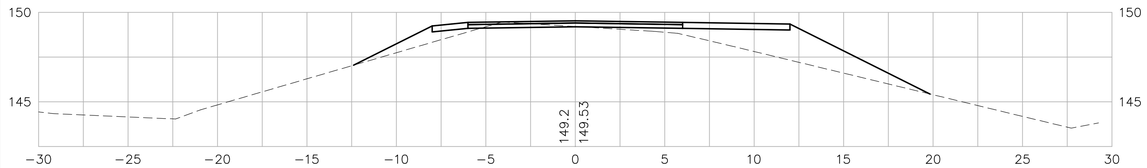


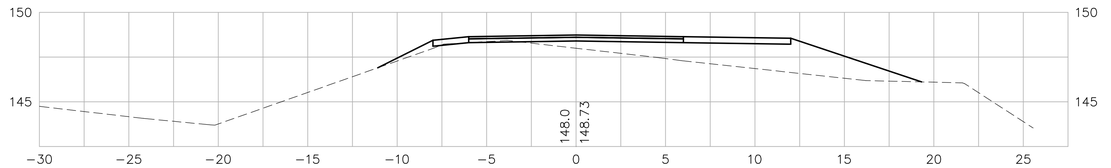
149+00



146+50



148+50



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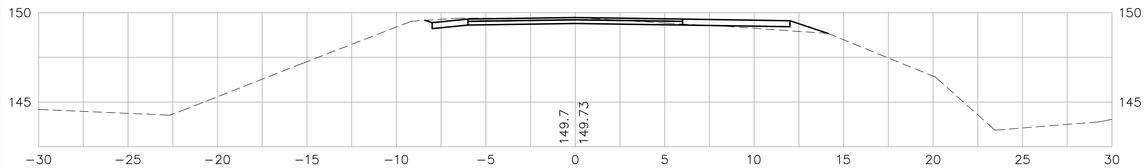
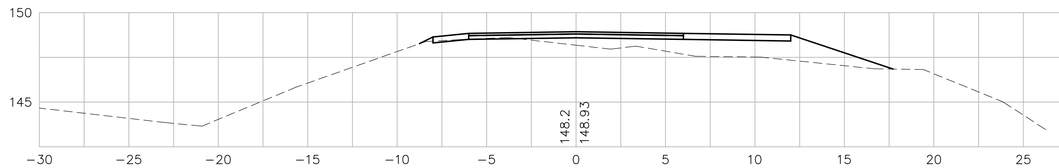


148+00



GRAPHIC SCALE

0 2 4 6 8 12 FEET

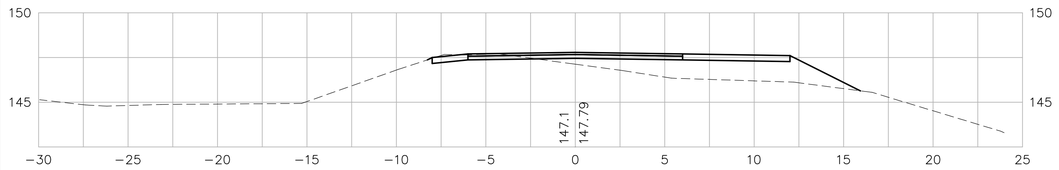
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

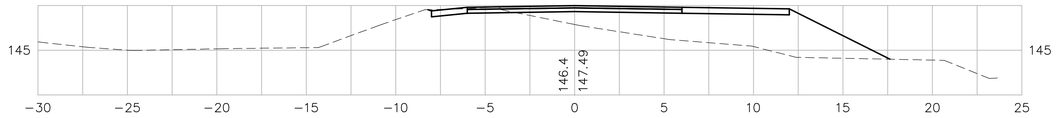
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	104	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

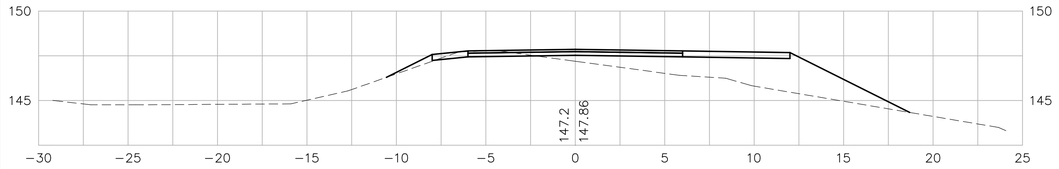
151+50



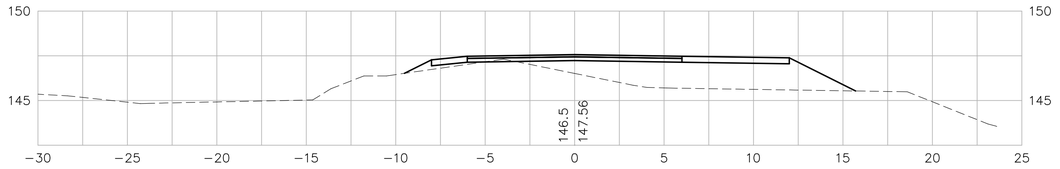
153+50



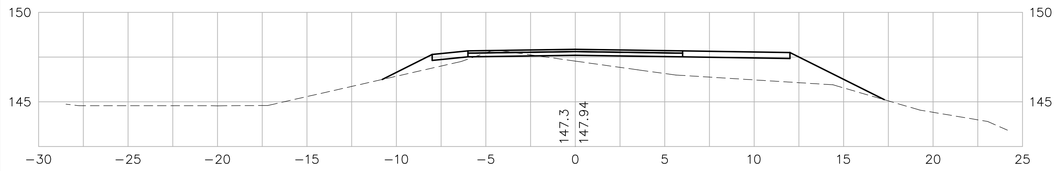
151+00



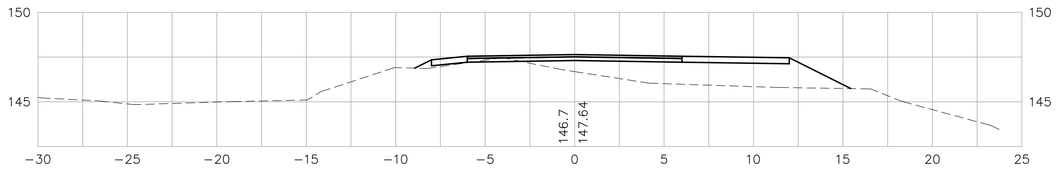
153+00



150+50



152+50



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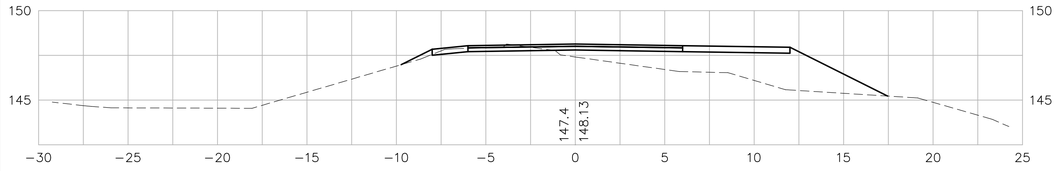
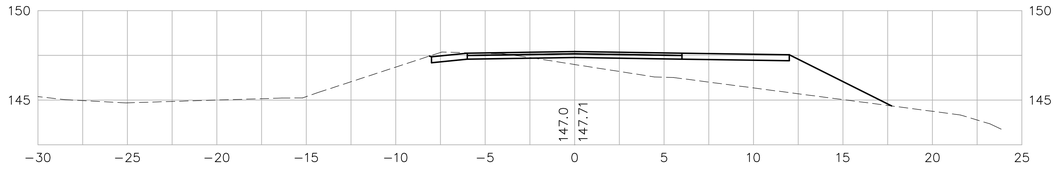


152+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

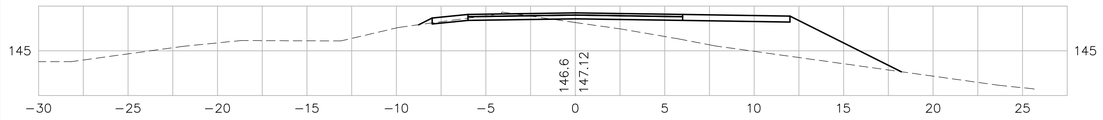
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

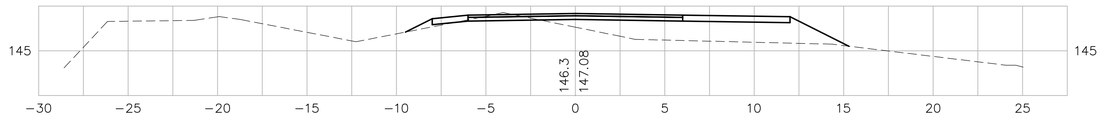
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	105	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

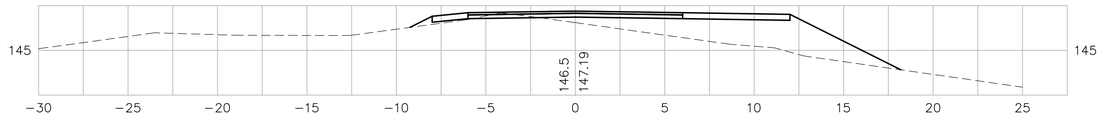
156+00



158+50



155+50



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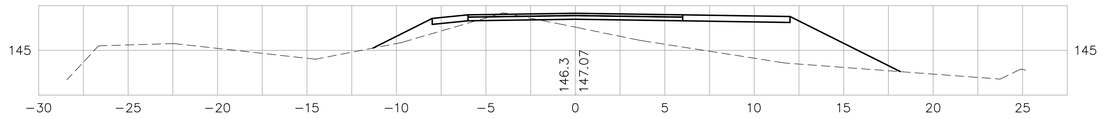

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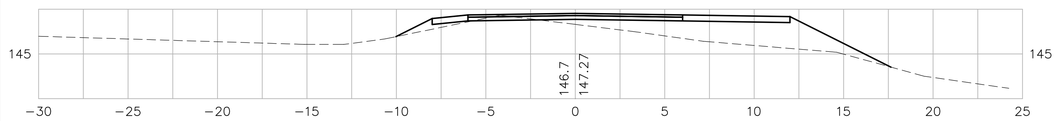
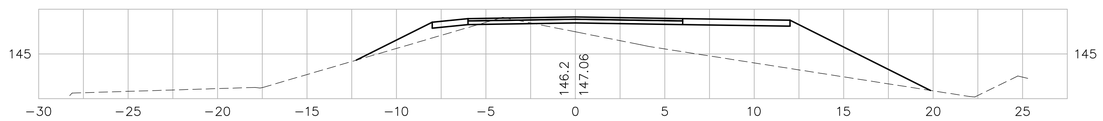
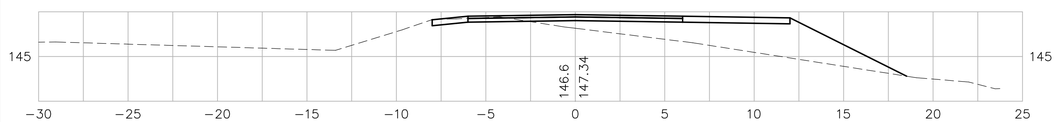


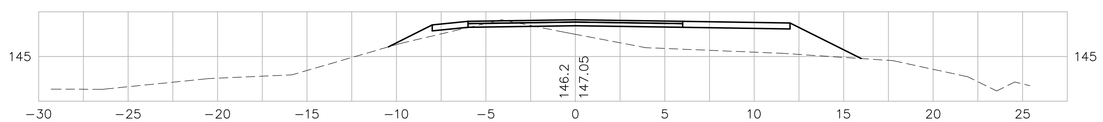
157+50



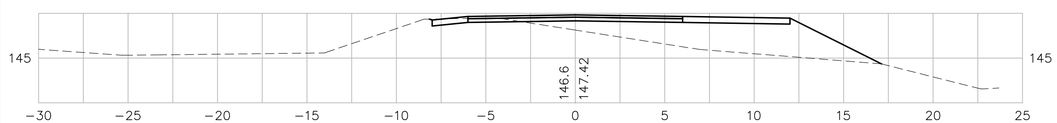
154+50



157+00



154+00



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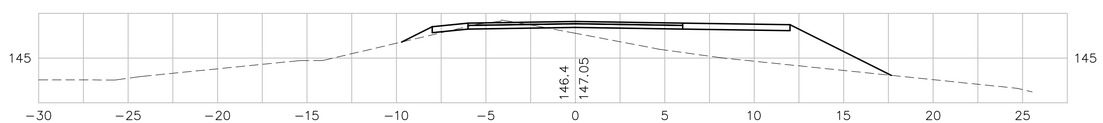
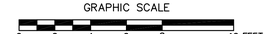


GRAPHIC SCALE

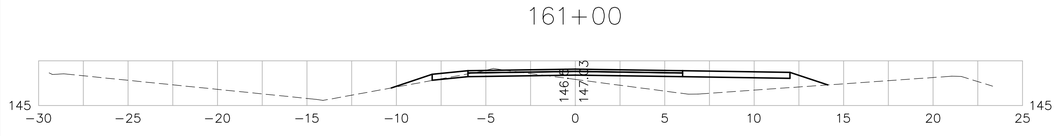


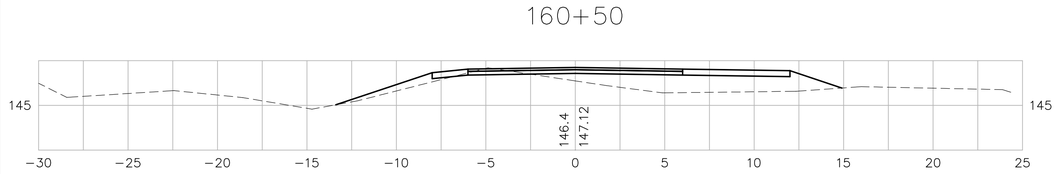
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

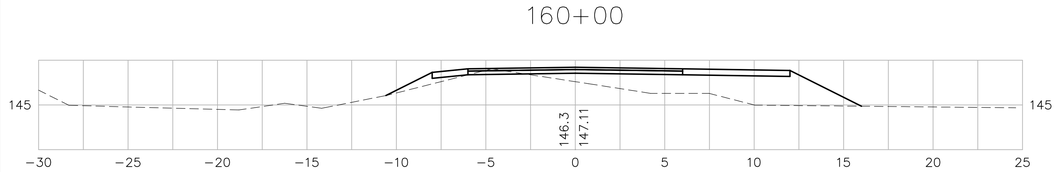
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

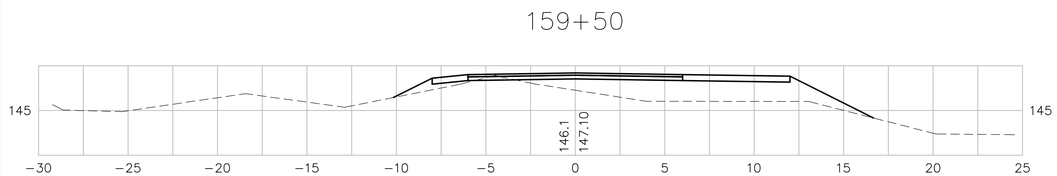
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	106	137
PROJECT FILE NO. 604532				

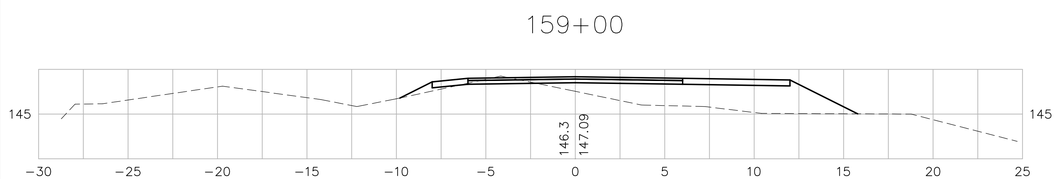
CROSS SECTIONS

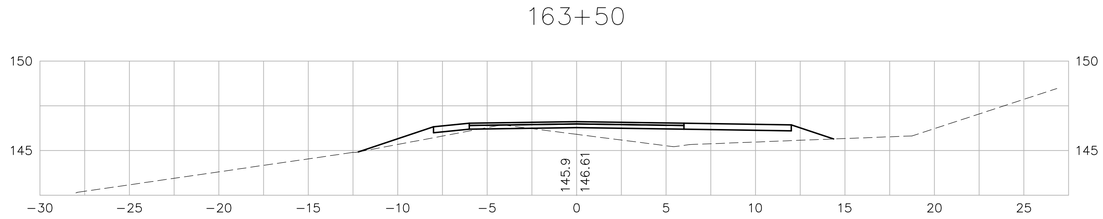


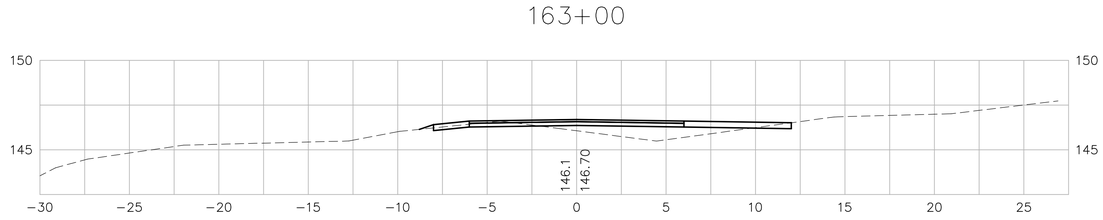


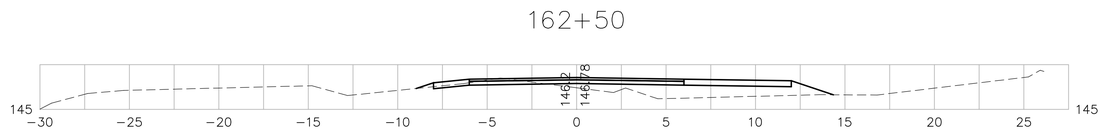


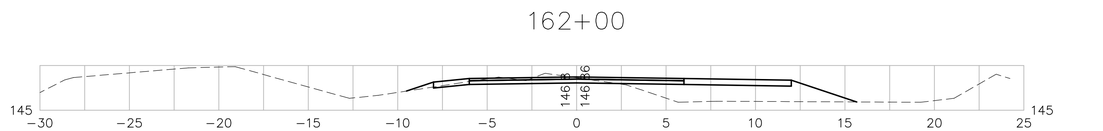


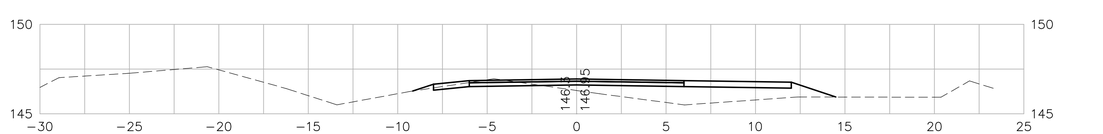












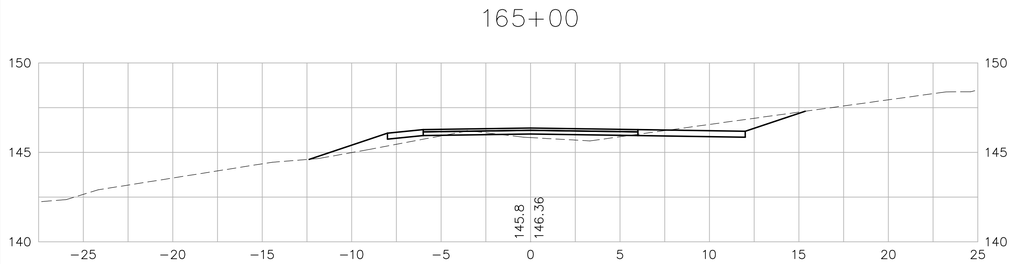
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

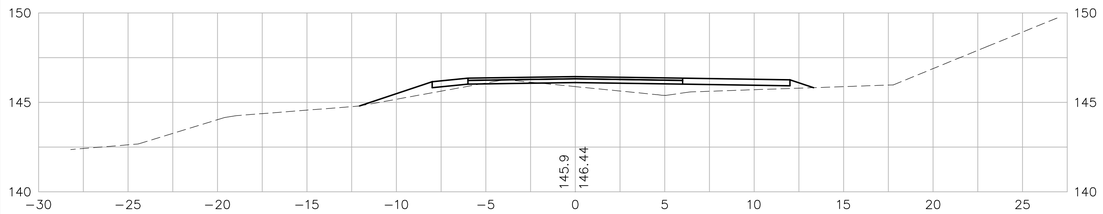
GRAPHIC SCALE
0 2 4 6 8 12 FEET

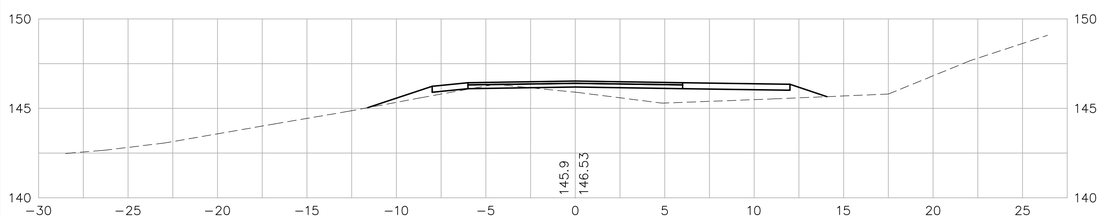
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

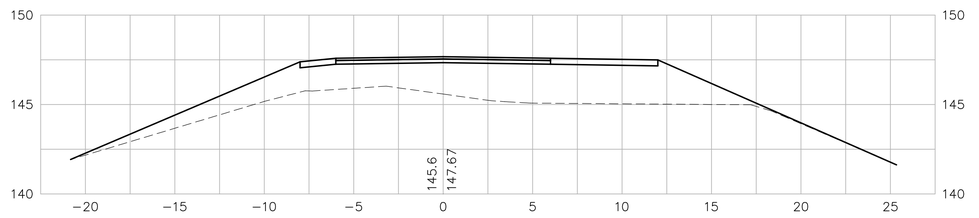
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	107	137
PROJECT FILE NO. 604532				

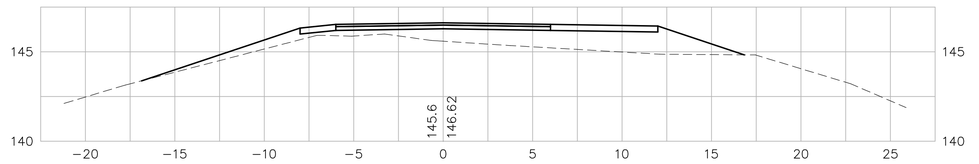
CROSS SECTIONS

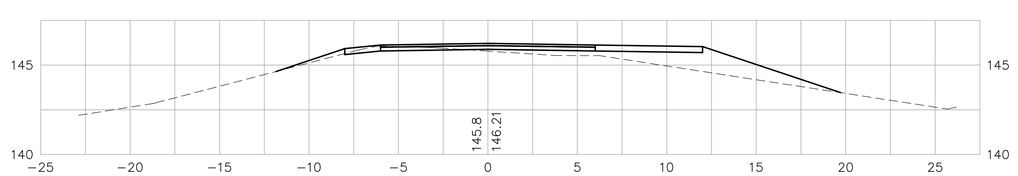


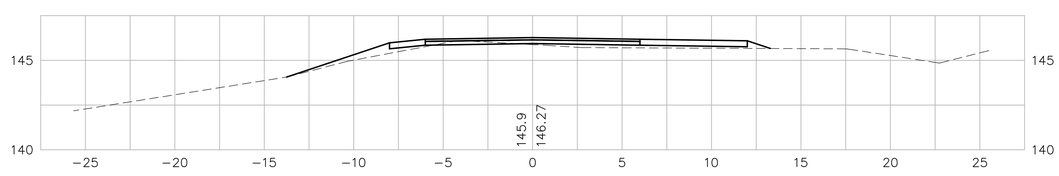












GRAPHIC SCALE
0 2 4 6 8 12 FEET

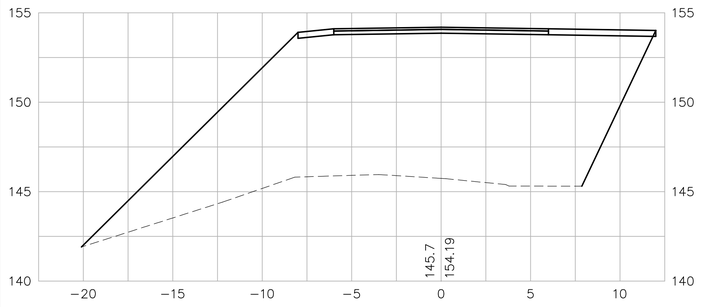
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

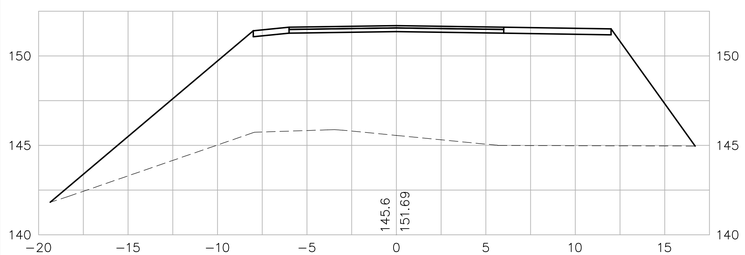
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	108	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

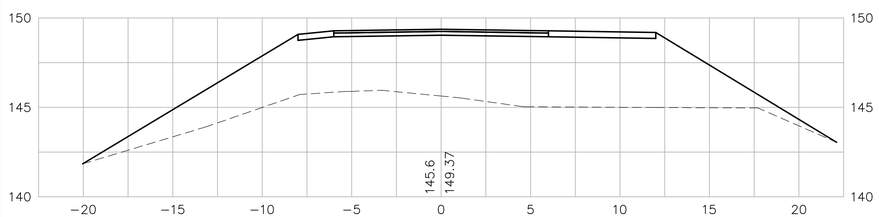
168+50



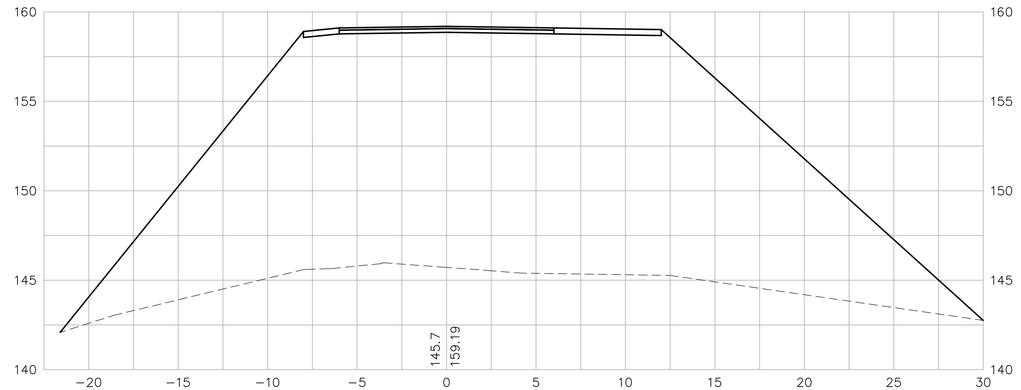
168+00



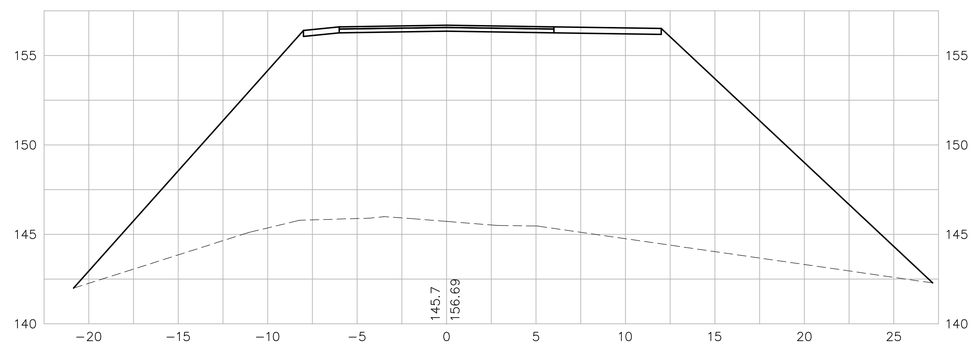
167+50



169+50



169+00



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

GRAPHIC SCALE
0 2 4 6 8 12 FEET

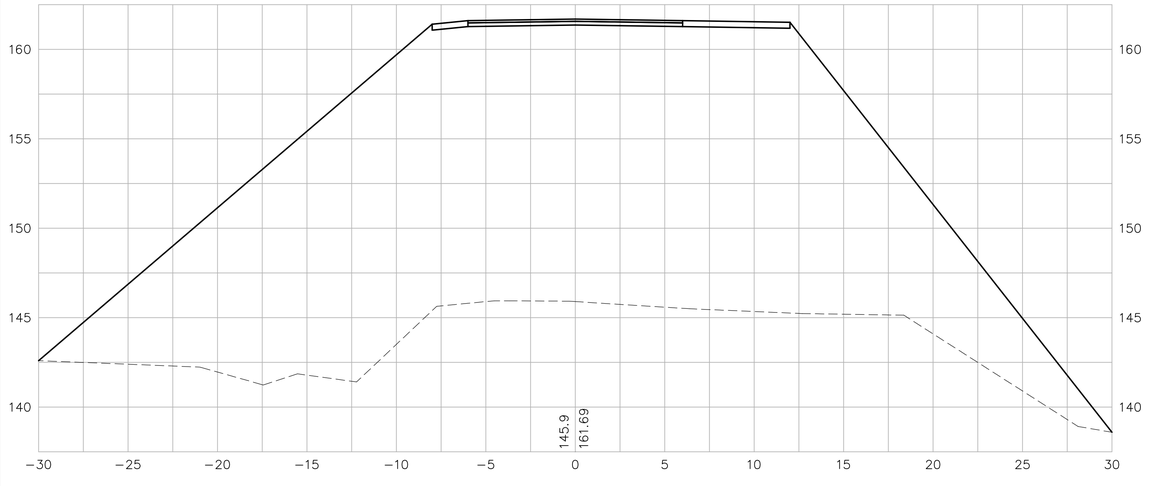
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	109	137
PROJECT FILE NO. 604532				

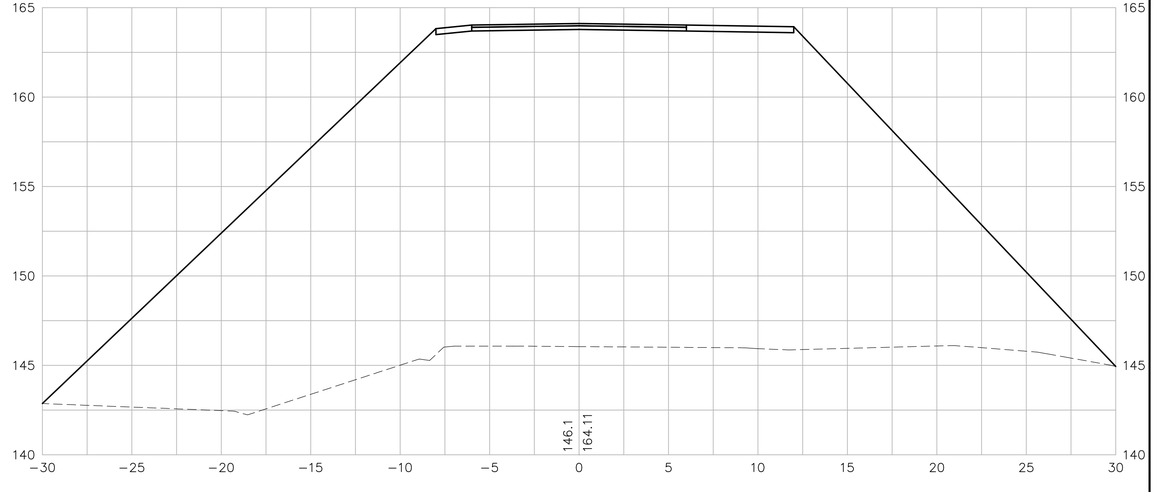
CROSS SECTIONS

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

170+00



170+50



GRAPHIC SCALE
0 2 4 6 8 12 FEET

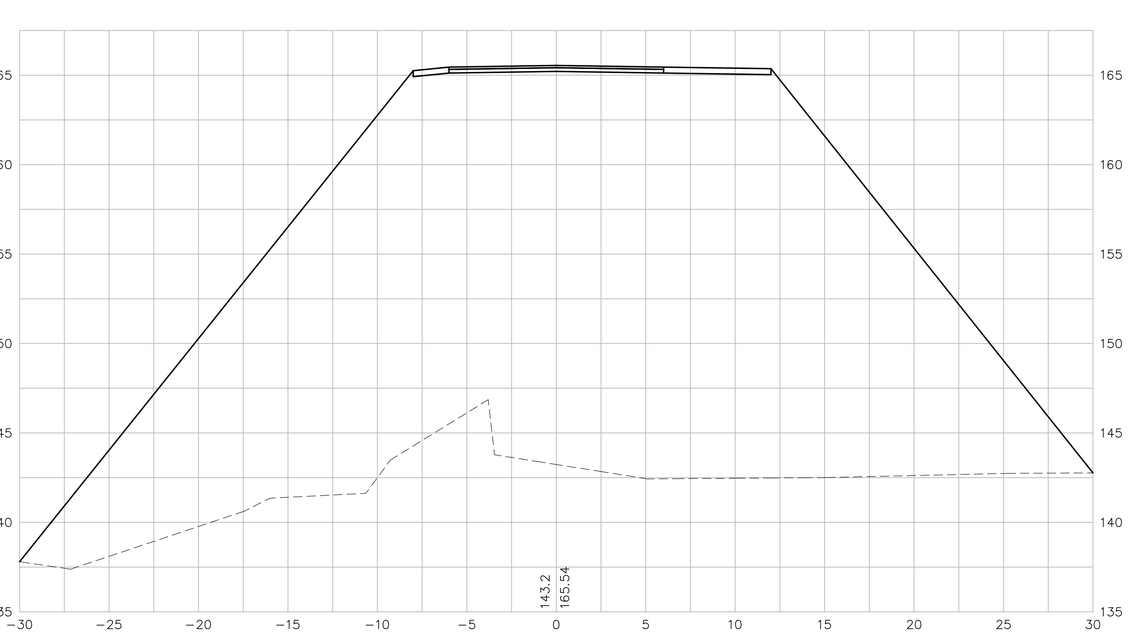
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

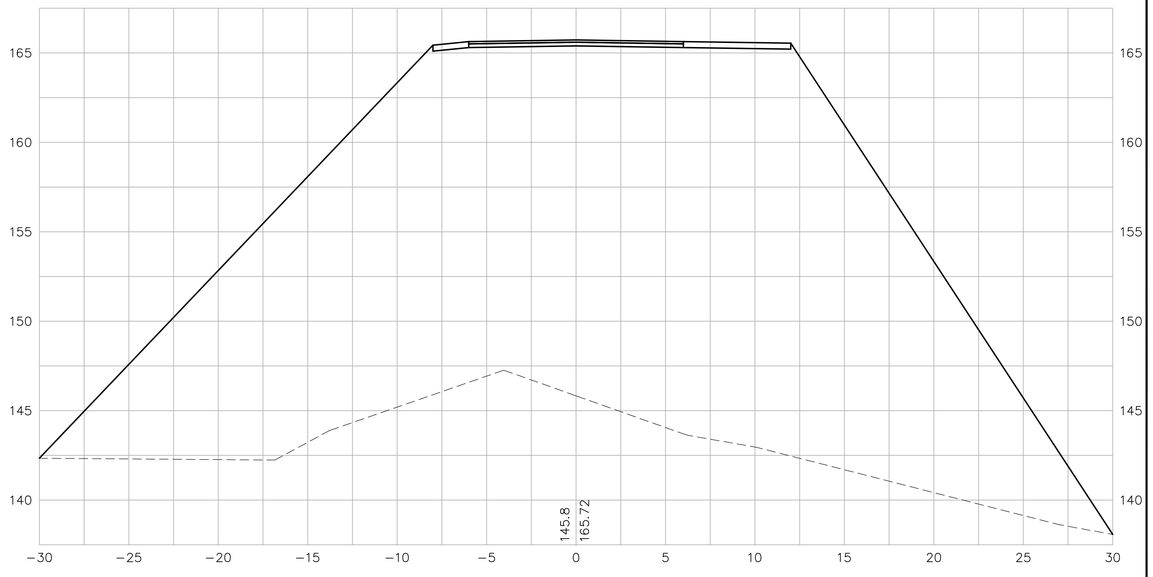
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	110	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

171+00



171+50



GRAPHIC SCALE

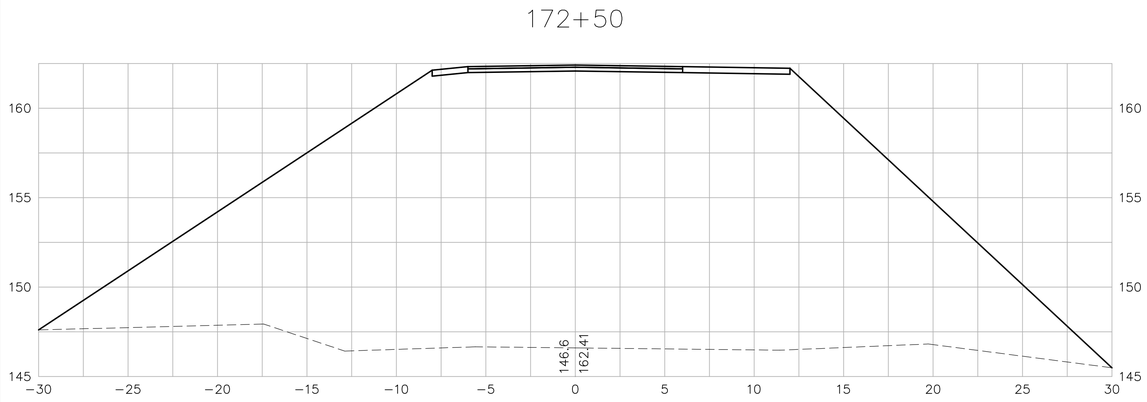
0 2 4 6 8 12 FEET

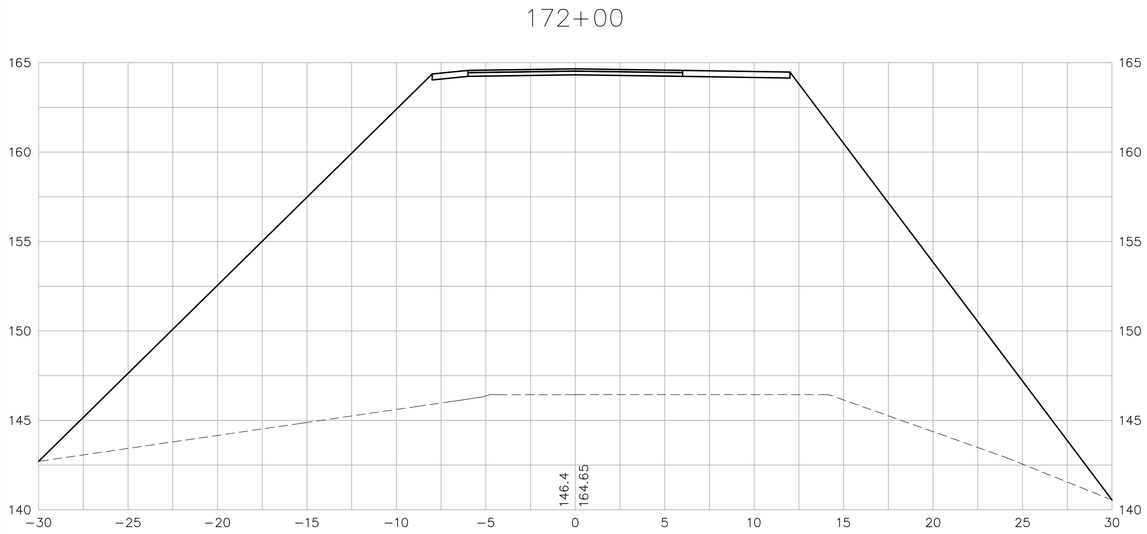
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

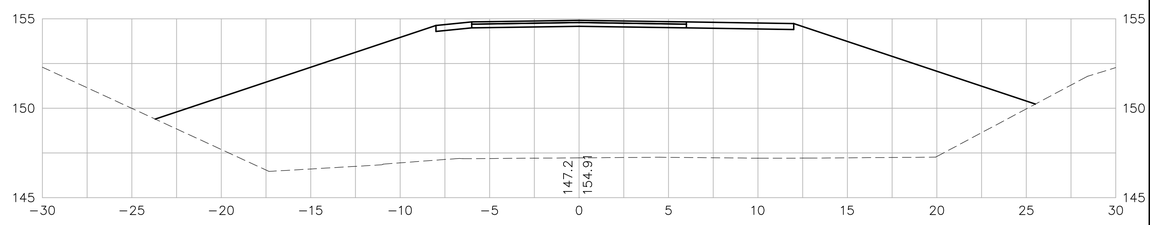
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

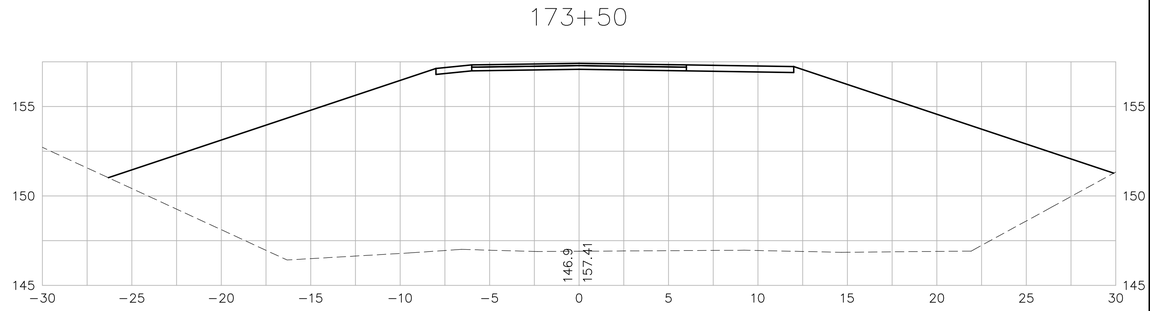
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	111	137
PROJECT FILE NO. 604532				

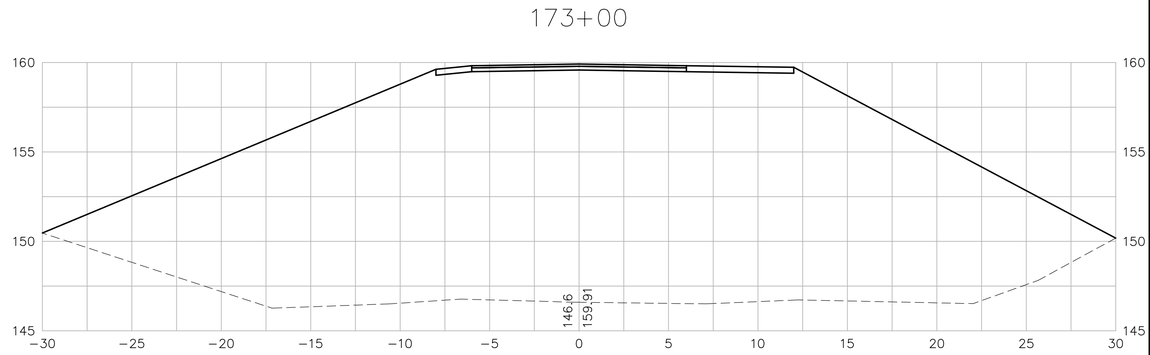
CROSS SECTIONS











GRAPHIC SCALE
0 2 4 6 8 12 FEET

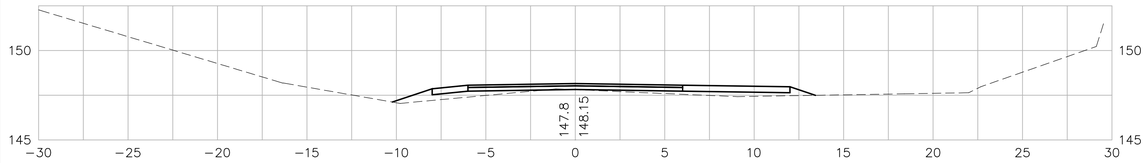
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

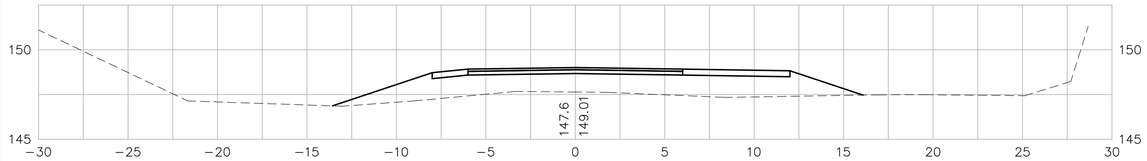
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	112	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

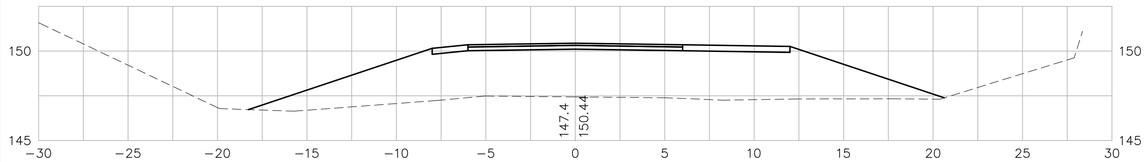
176+00



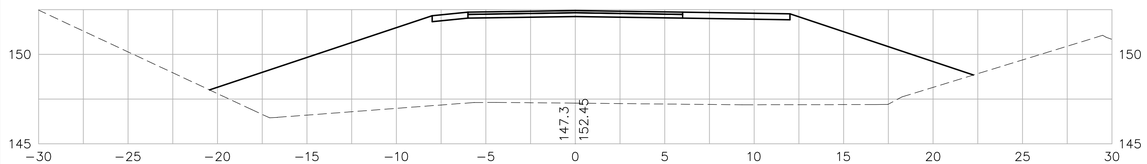
175+50



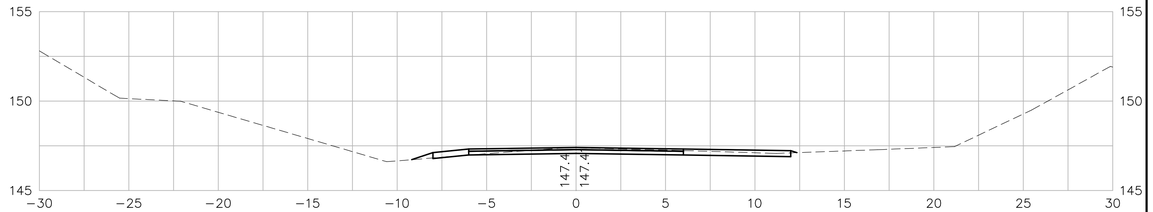
175+00



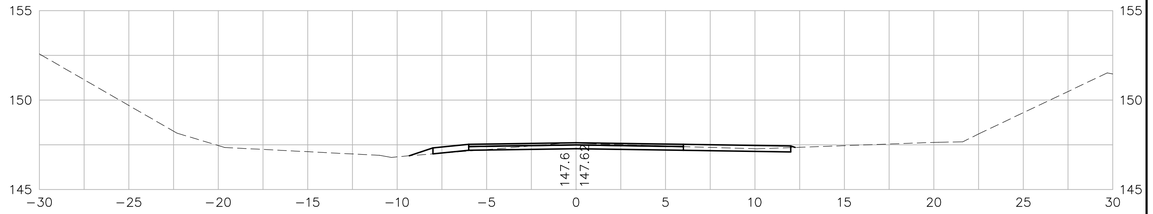
174+50



177+50



177+00



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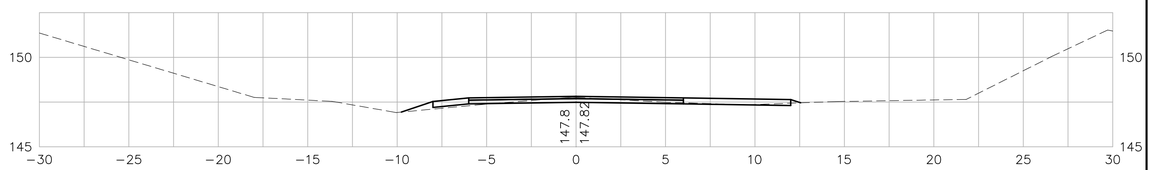


GRAPHIC SCALE
0 2 4 6 8 12 FEET

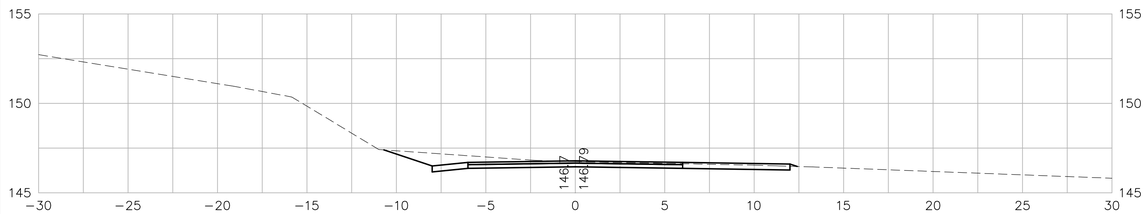
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

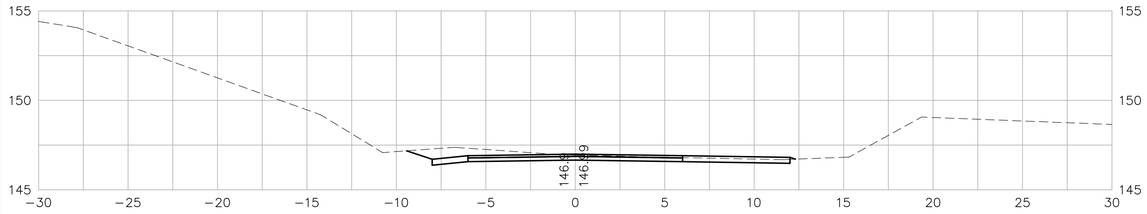
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	113	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

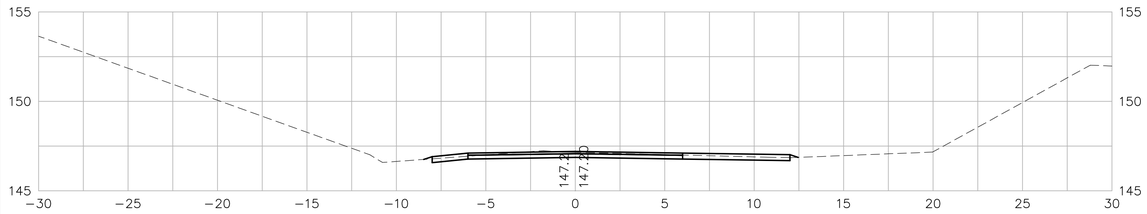
179+00



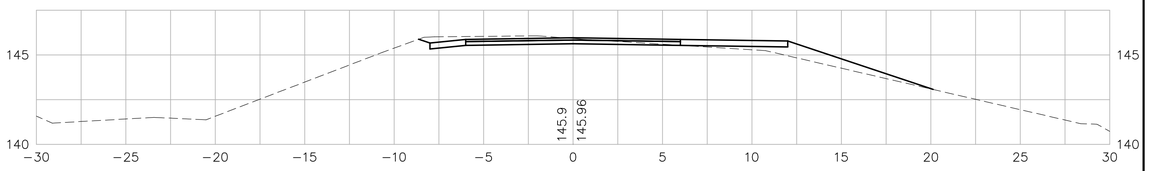
178+50



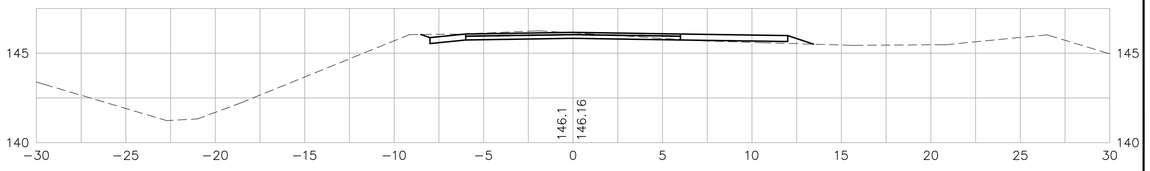
178+00



181+00



180+50



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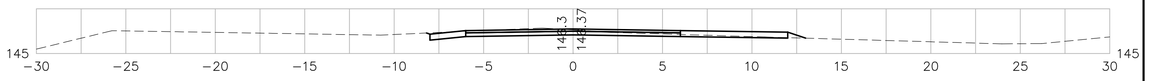
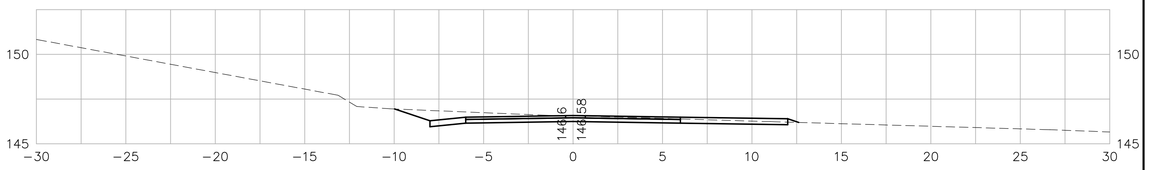


179+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

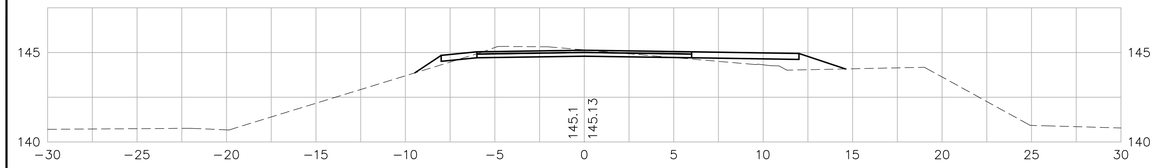
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

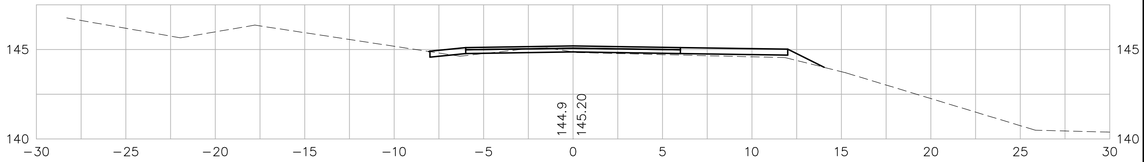
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	114	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

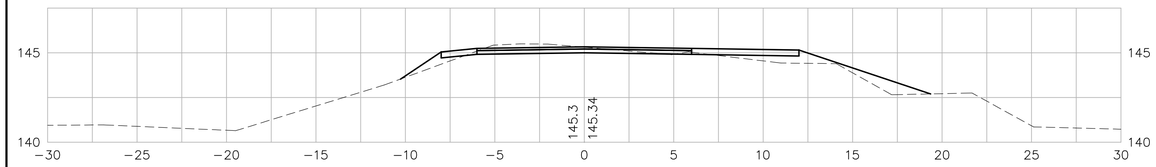
183+00



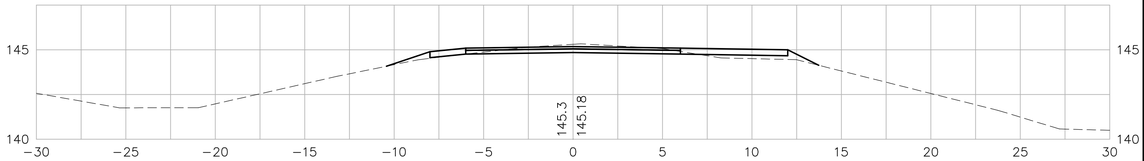
185+00



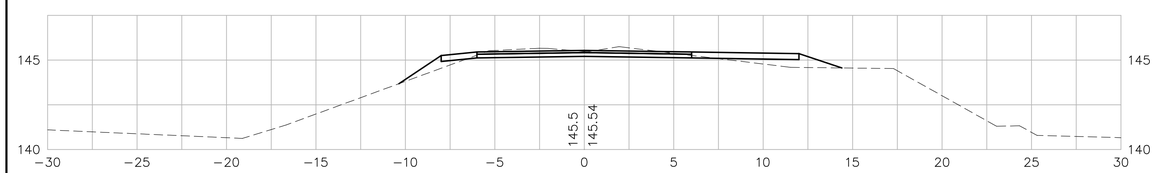
182+50



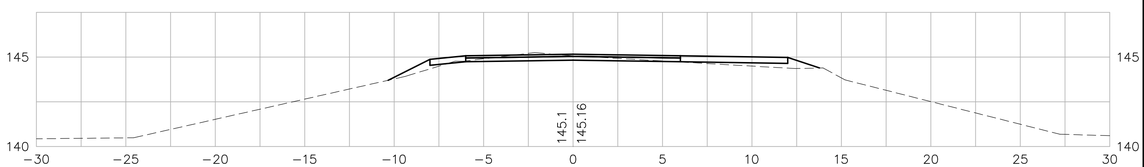
184+50



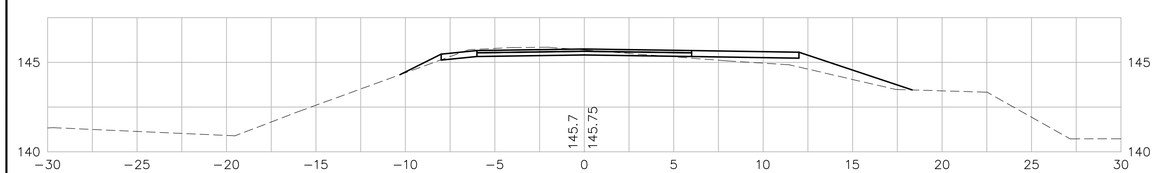
182+00



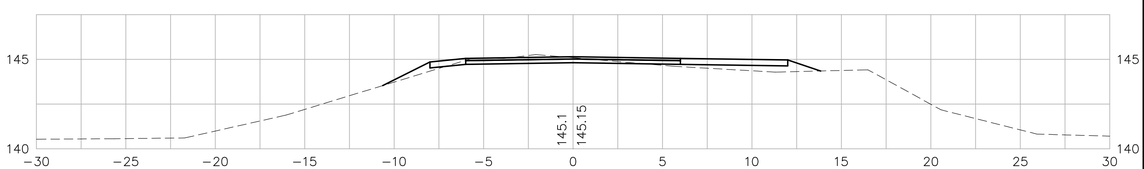
184+00



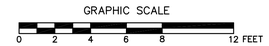
181+50



183+50



GRAPHIC SCALE

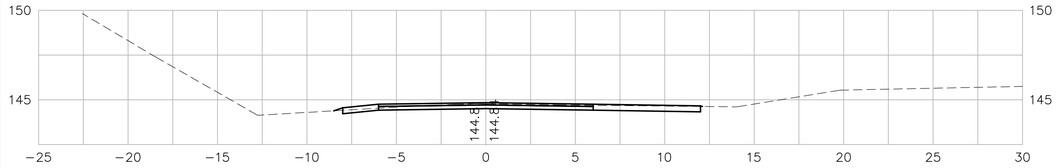


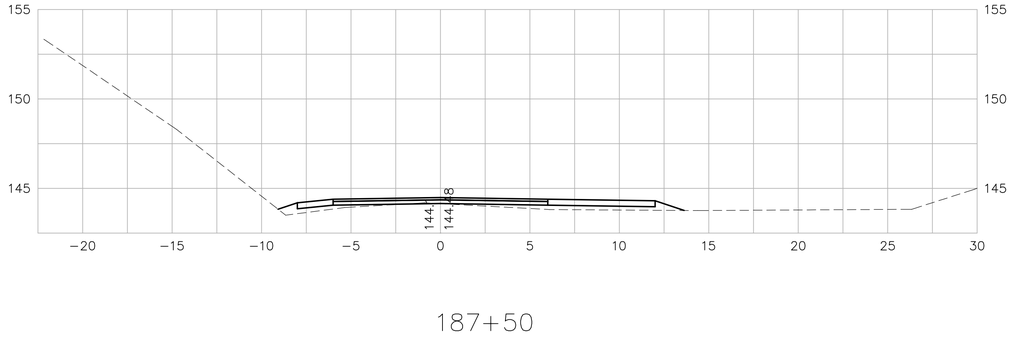
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

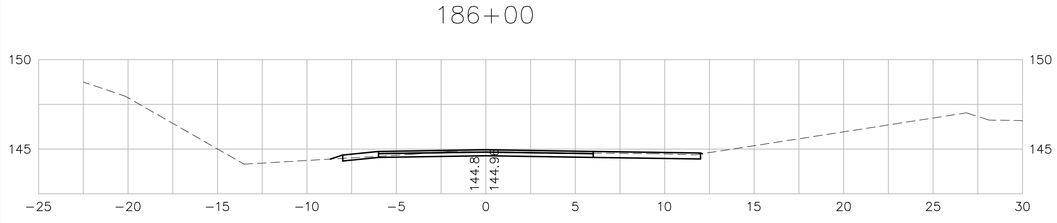
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

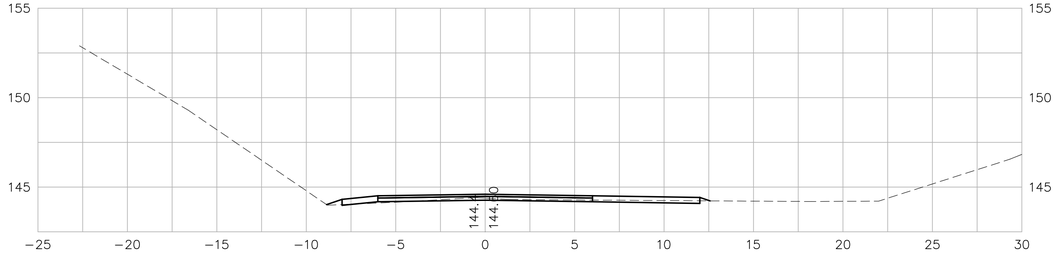
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	115	137
PROJECT FILE NO. 604532				

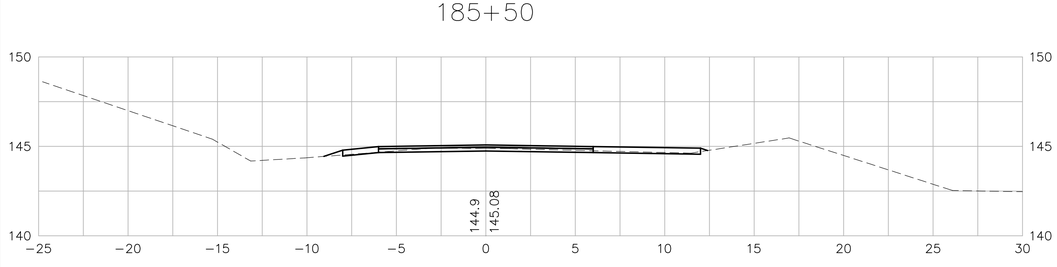
CROSS SECTIONS

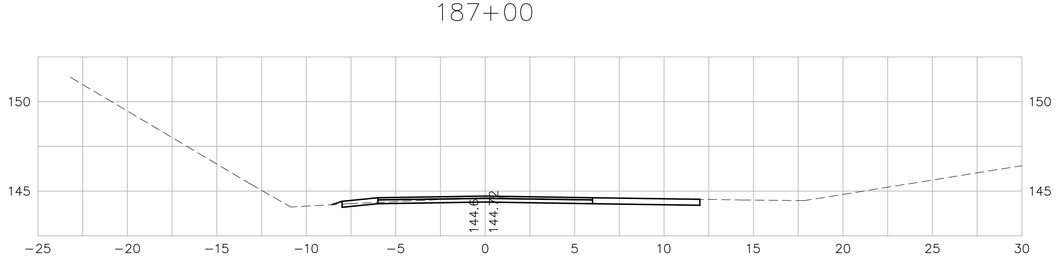












IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

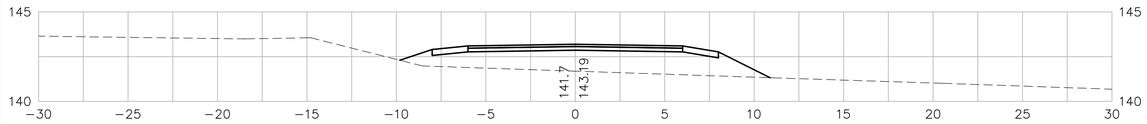
GRAPHIC SCALE
0 2 4 6 8 12 FEET

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	116	137
PROJECT FILE NO. 604532				

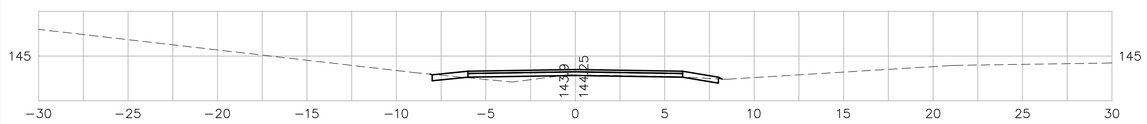
CROSS SECTIONS

190+00

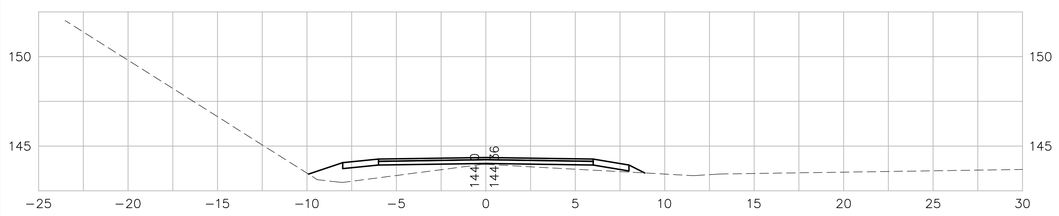


189+50

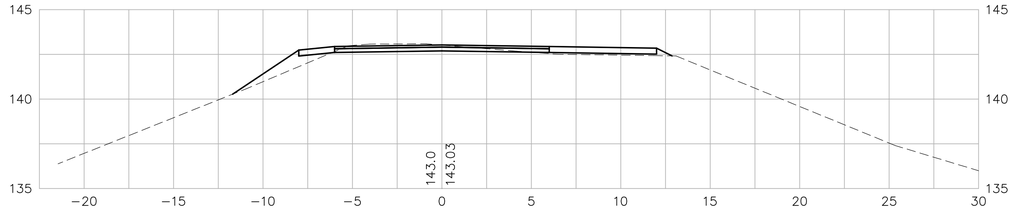
189+00



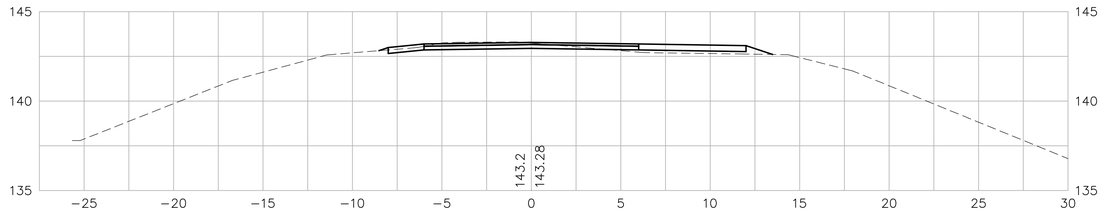
188+50



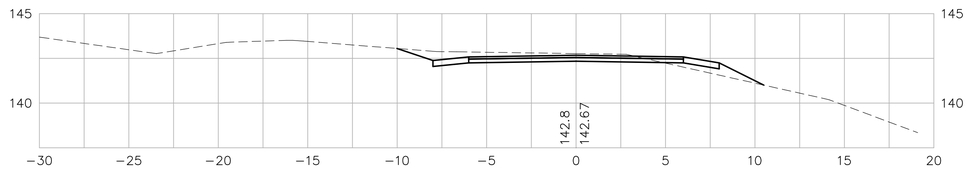
191+50



191+00



190+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

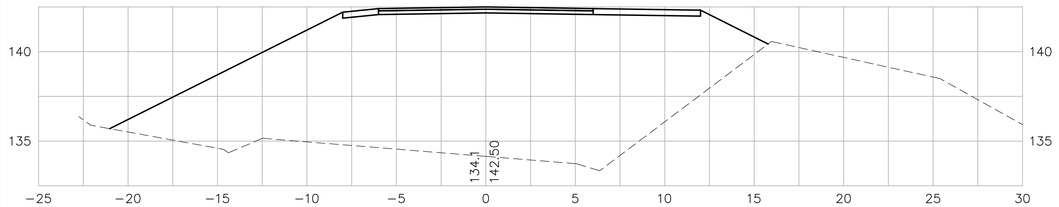
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

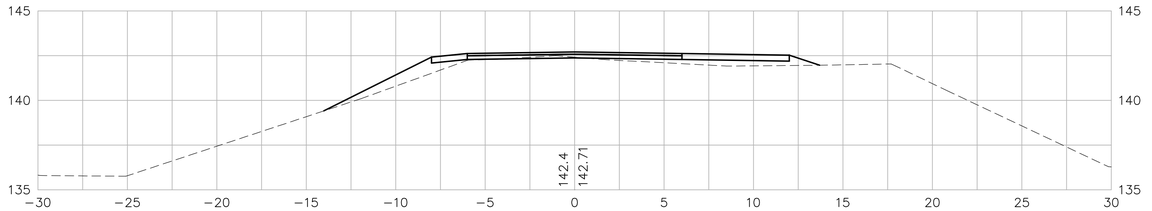
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	117	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

193+00



194+50



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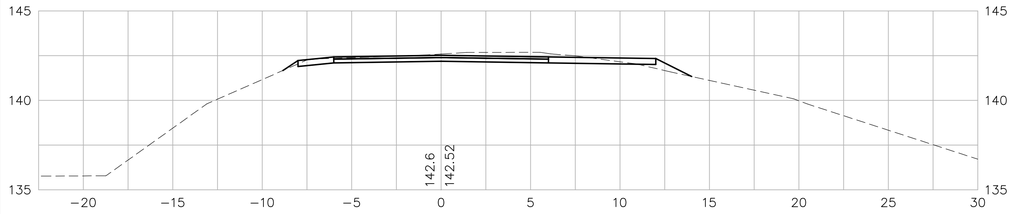

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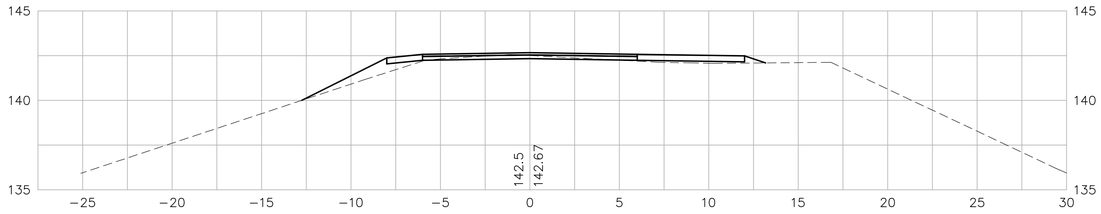
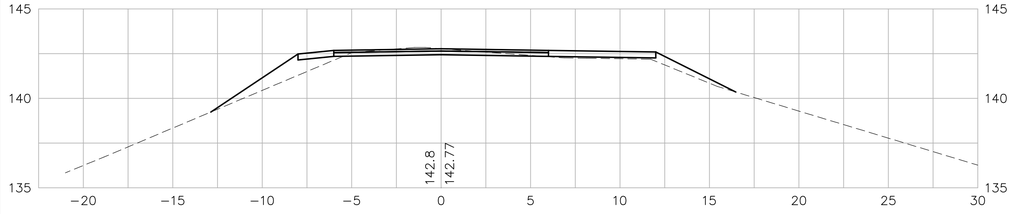
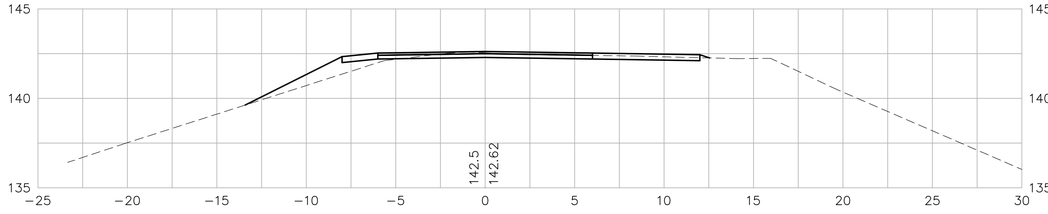


192+00



193+50



GRAPHIC SCALE

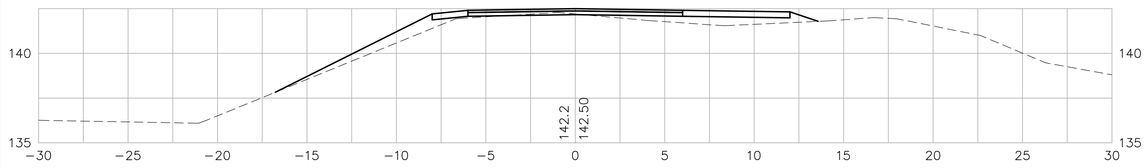
0 2 4 6 8 12 FEET

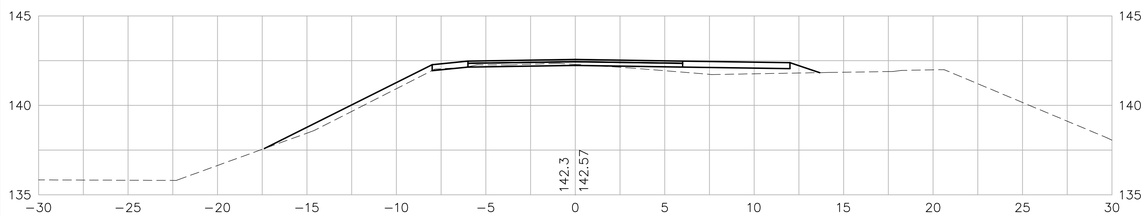
IN CHARGE OF	GJH
DESIGNED BY	CRB
CHECKED BY	GJH
DRAWN BY	CRB
CHECKED BY	GJH

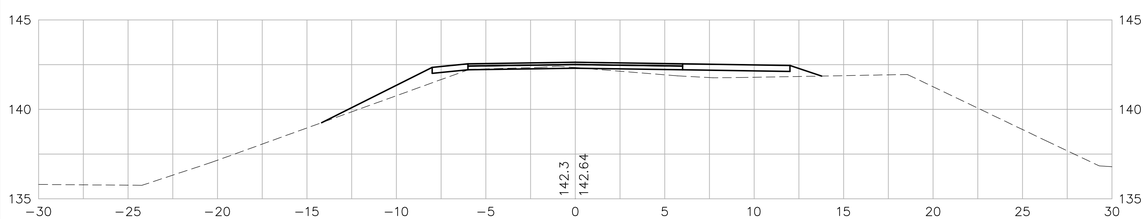
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

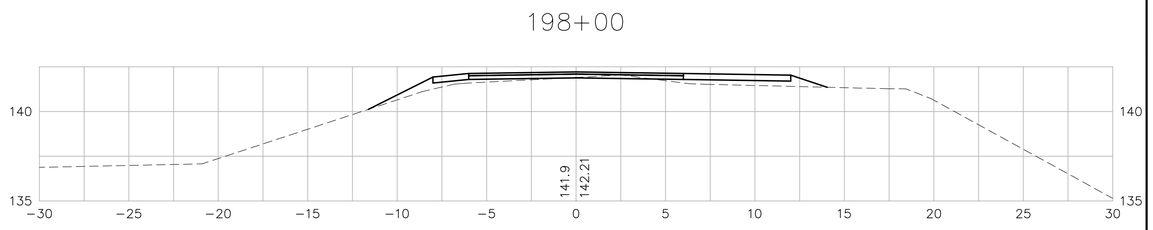
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	118	137
PROJECT FILE NO. 604532				

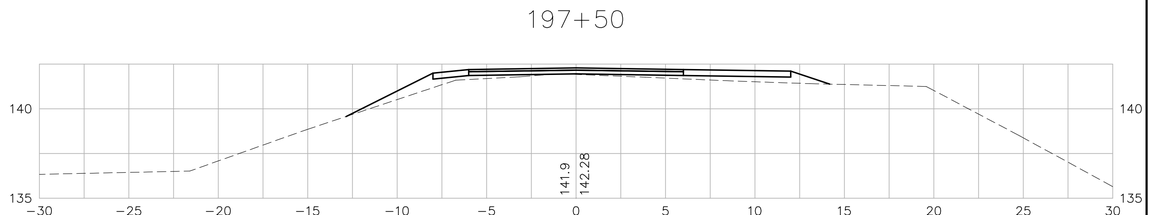
CROSS SECTIONS

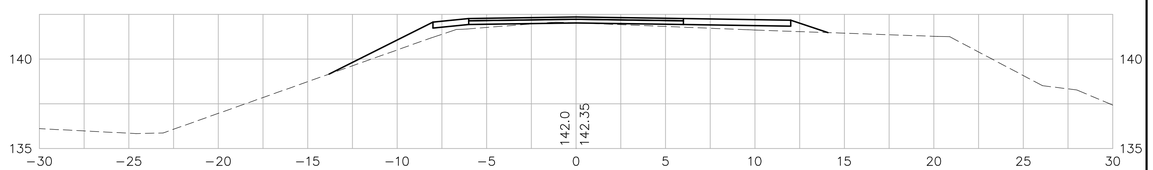


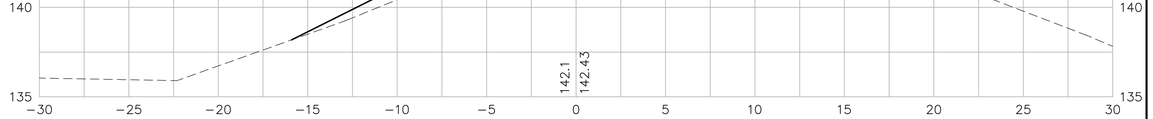




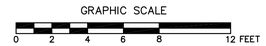








IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

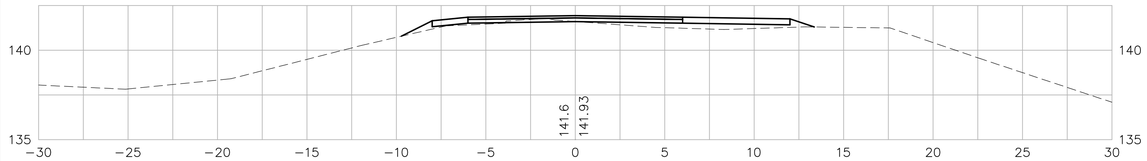


WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	119	137
PROJECT FILE NO. 604532				

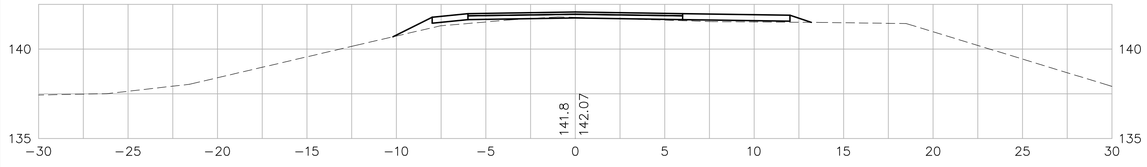
CROSS SECTIONS

200+00

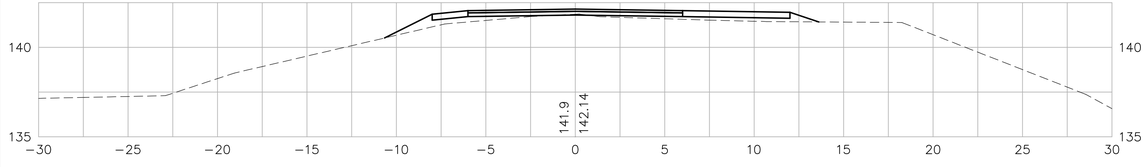


199+50

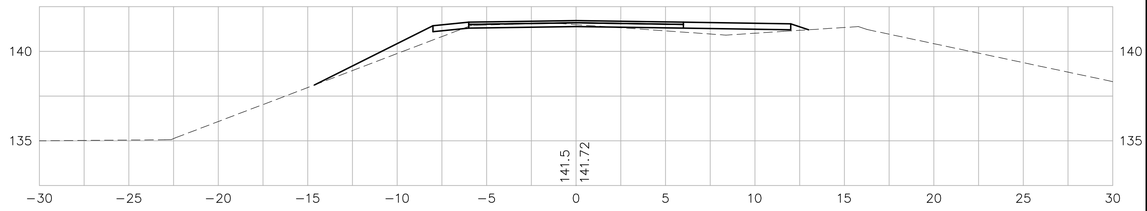
199+00



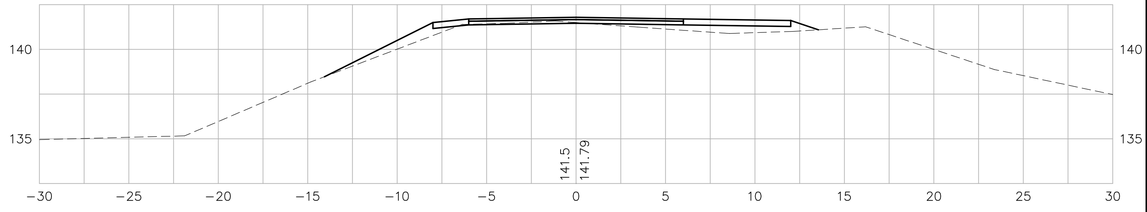
198+50



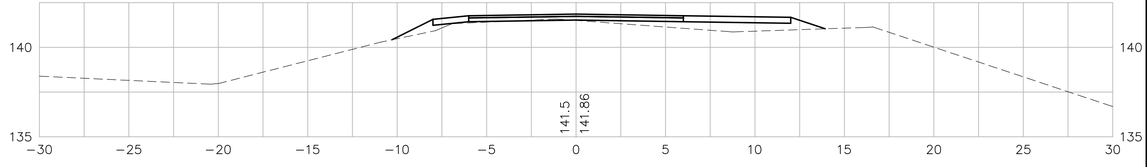
201+50



201+00



200+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

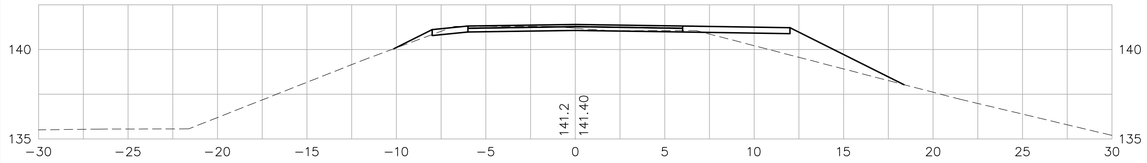
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

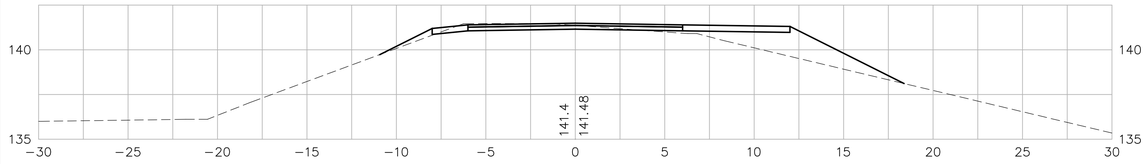
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	120	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

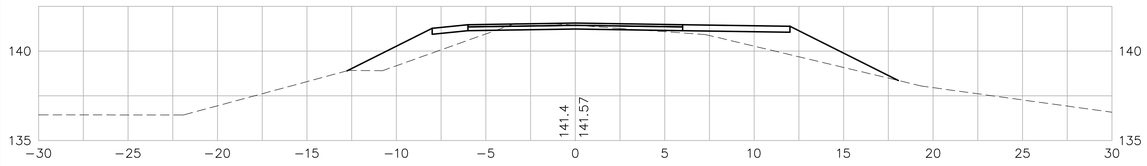
203+50



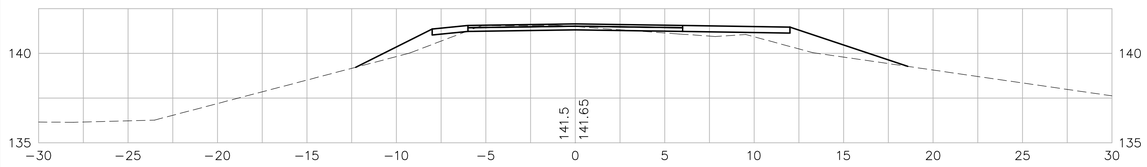
203+00



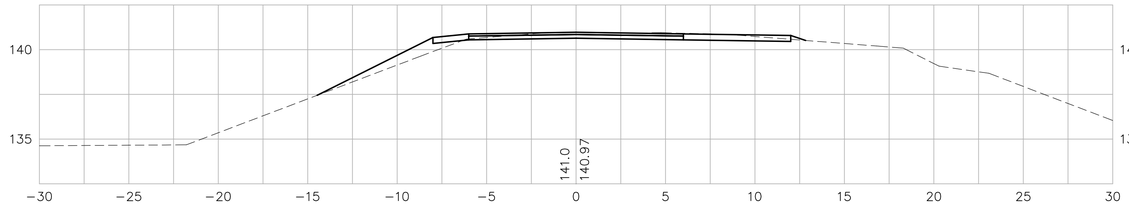
202+50



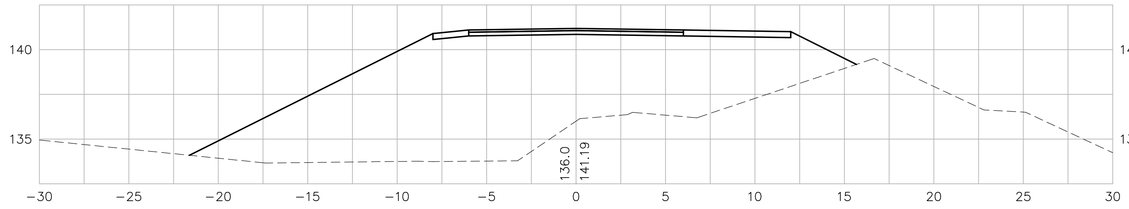
202+00



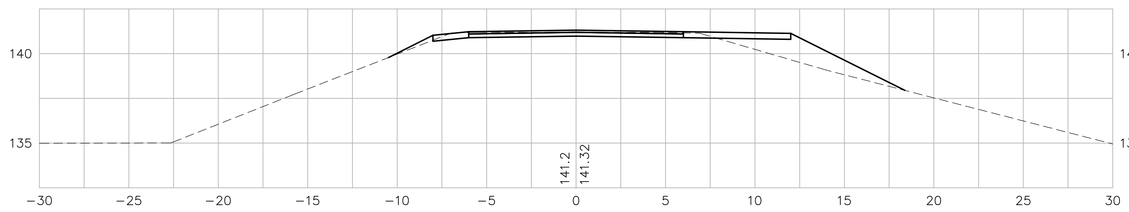
205+00



204+50



204+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

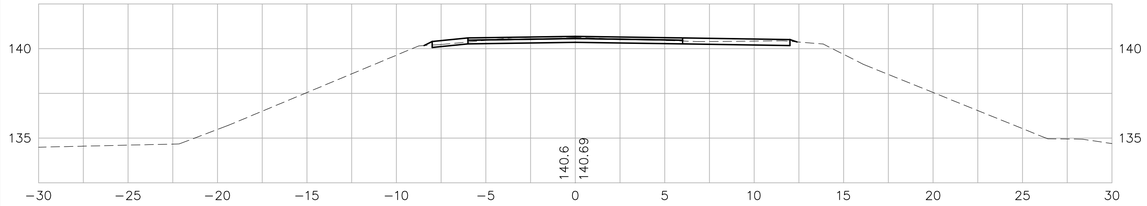
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

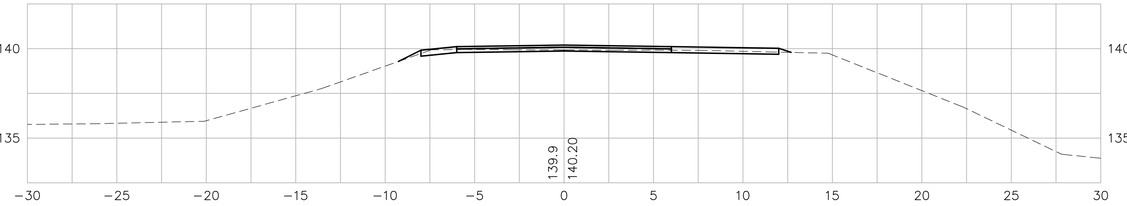
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	121	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

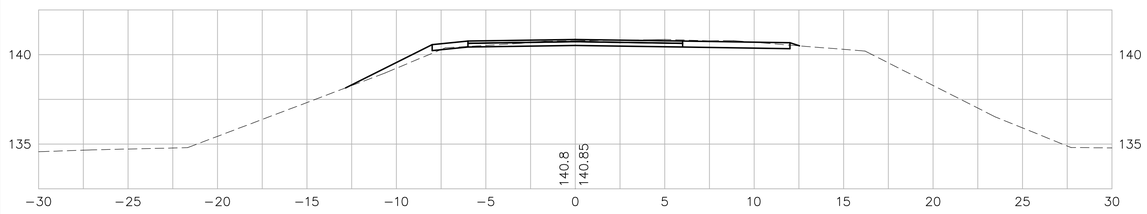
206+50



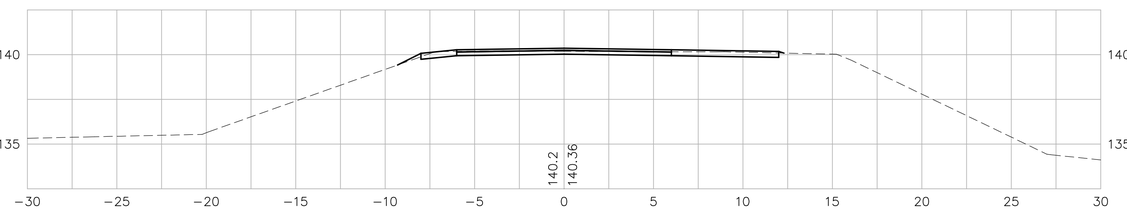
208+00



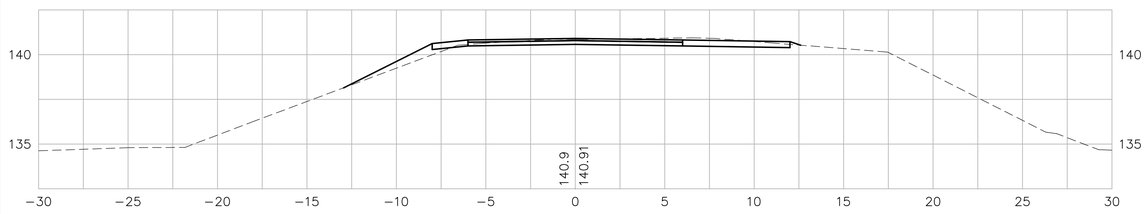
206+00



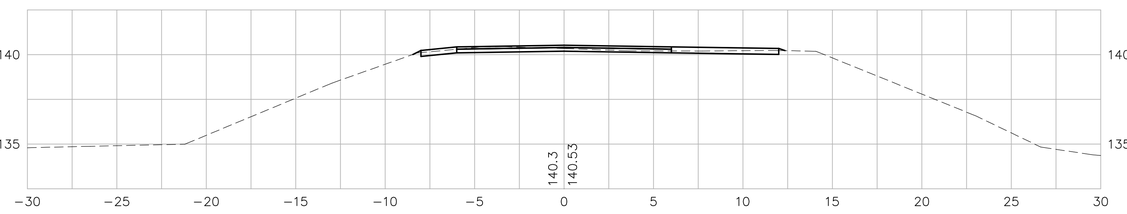
207+50



205+50



207+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

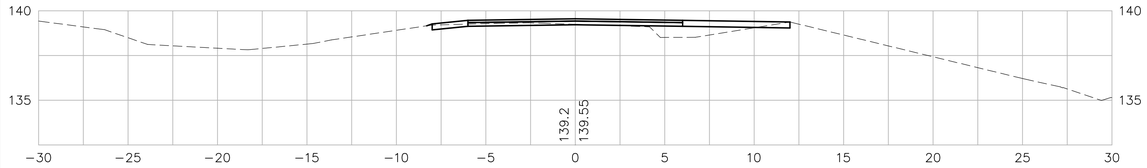
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

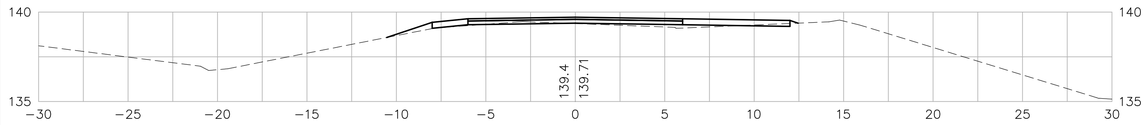
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	122	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

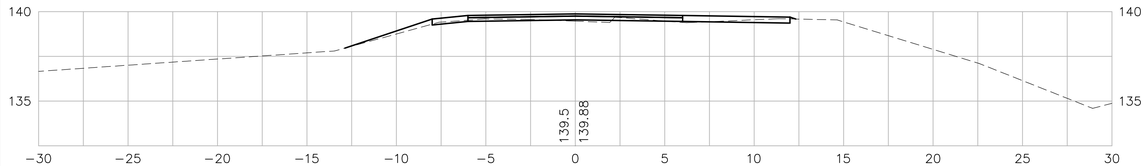
210+00



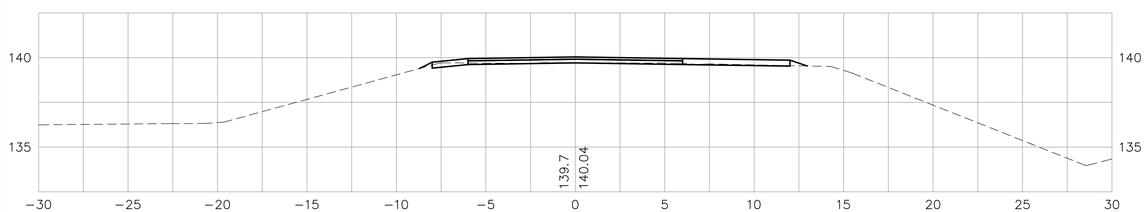
209+50



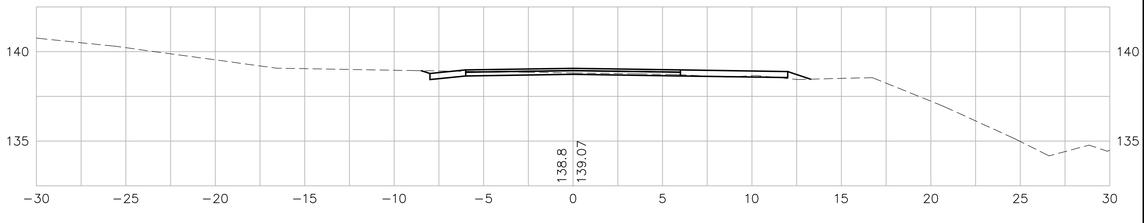
209+00



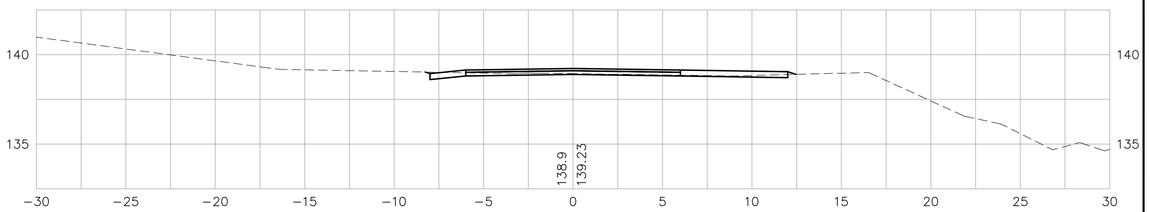
208+50



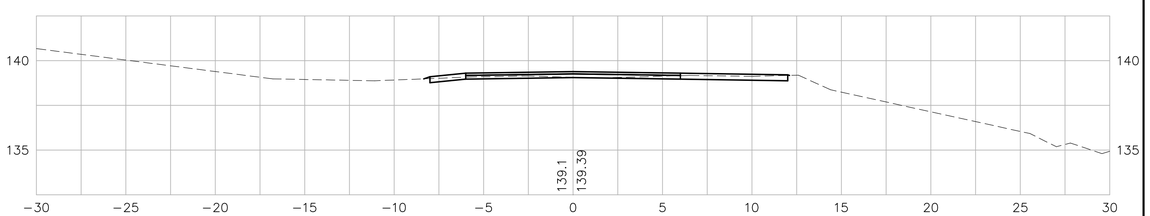
211+50



211+00



210+50



GRAPHIC SCALE
0 2 4 6 8 12 FEET

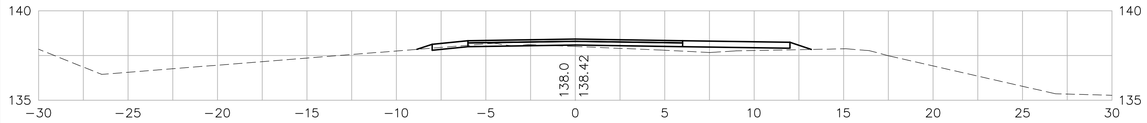
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

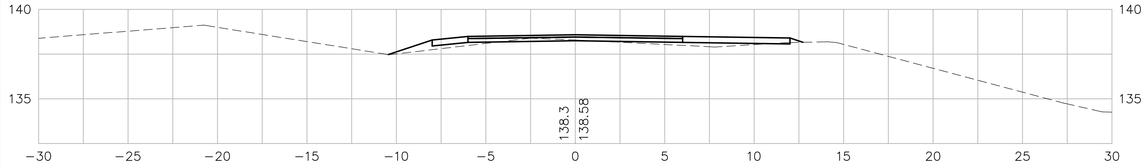
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	123	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

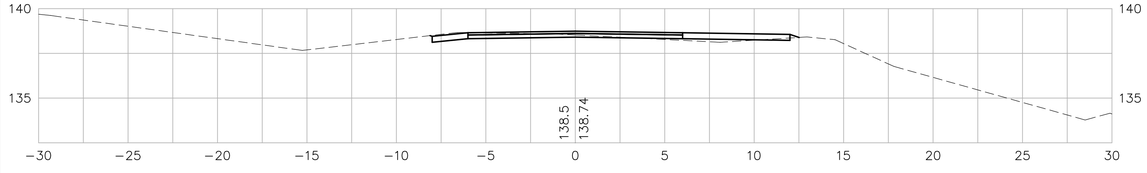
213+50



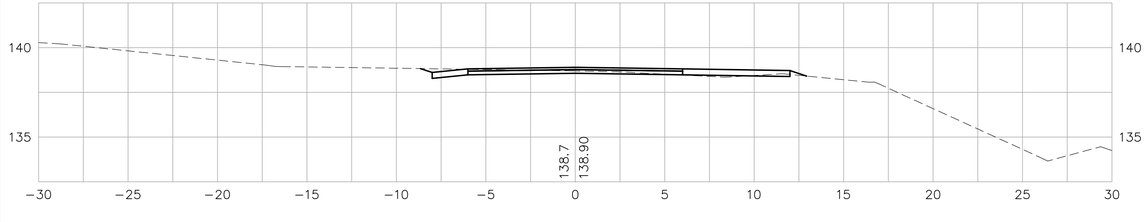
213+00



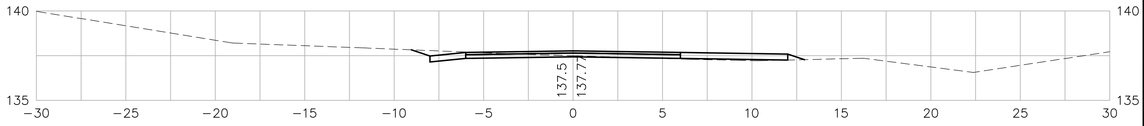
212+50



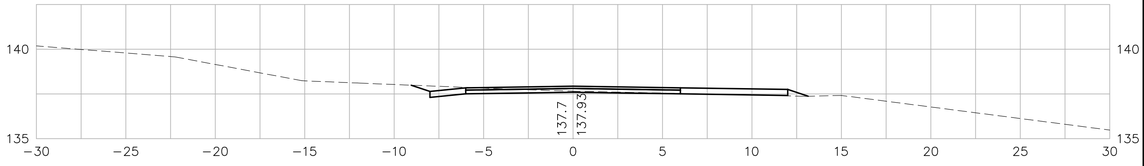
212+00



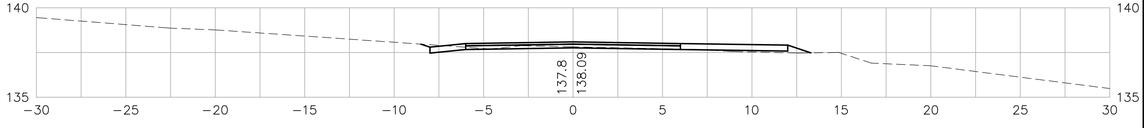
215+50



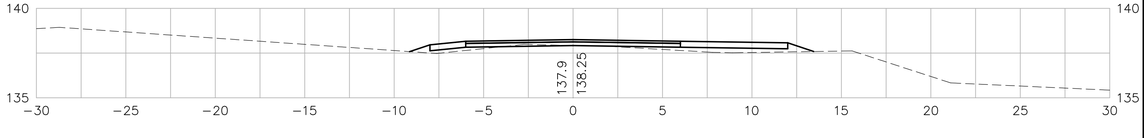
215+00



214+50



214+00



GRAPHIC SCALE

0 2 4 6 8 12 FEET

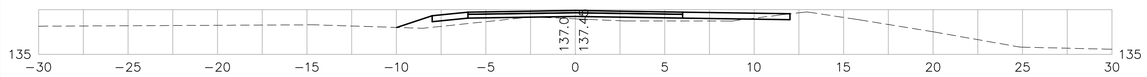
IN CHARGE OF	GJH
DESIGNED BY	CRB
CHECKED BY	GJH
DRAWN BY	CRB
CHECKED BY	GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

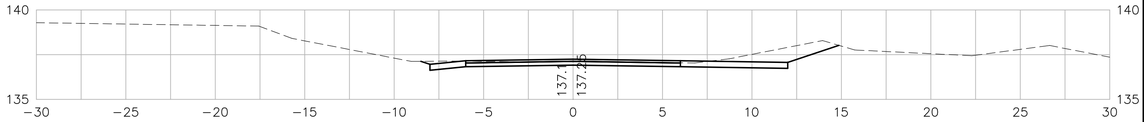
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	124	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

217+50



219+50



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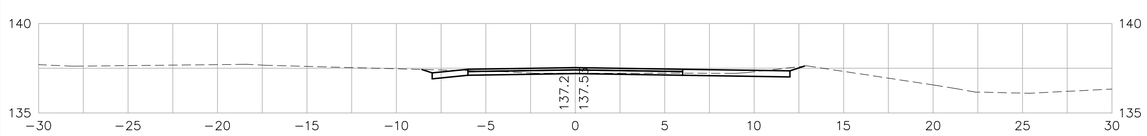
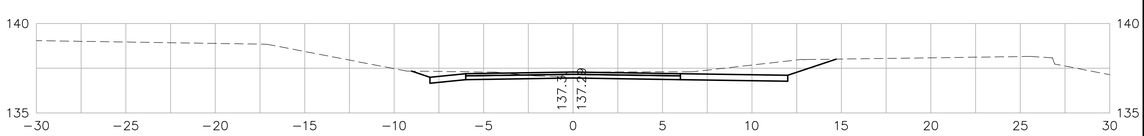
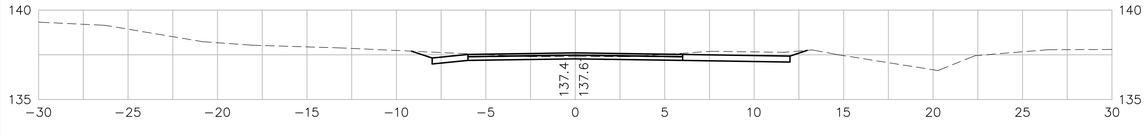


219+00



216+50



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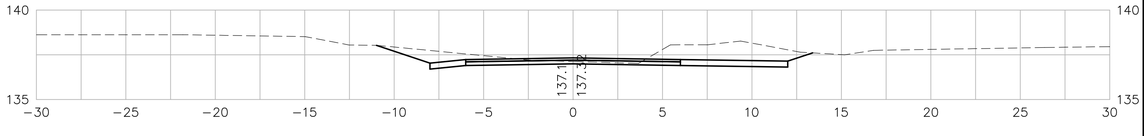

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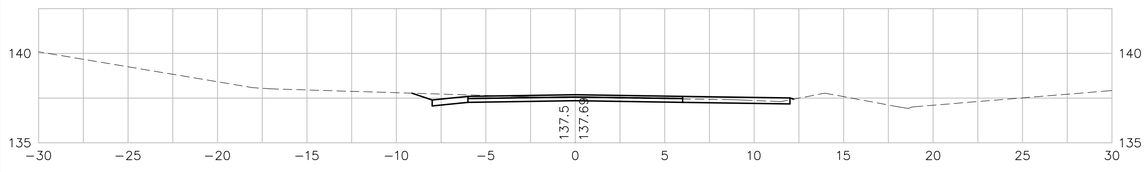

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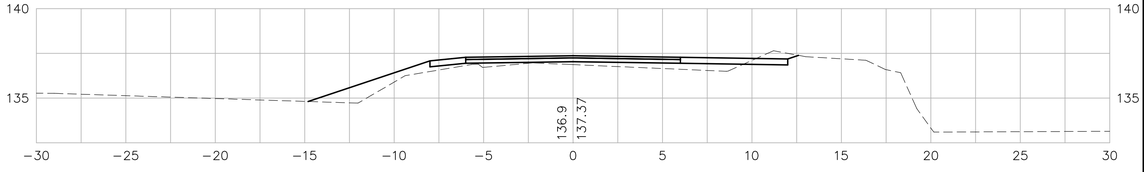
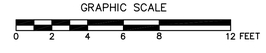


GRAPHIC SCALE

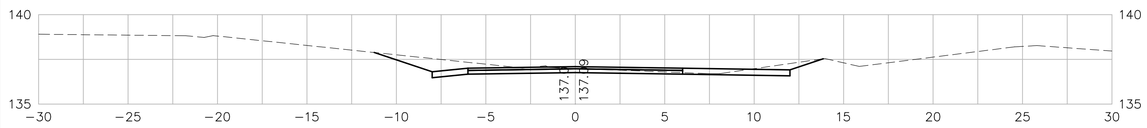


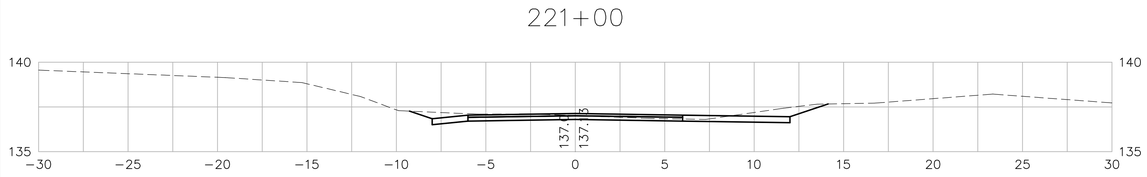
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

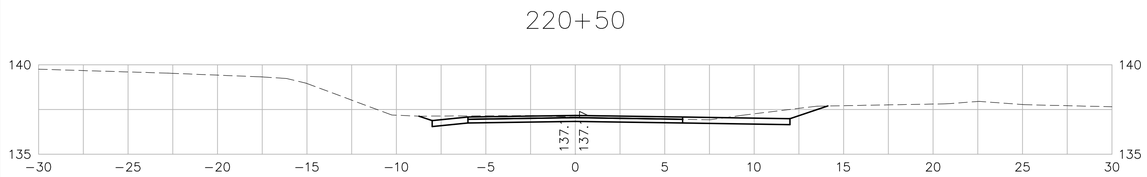
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

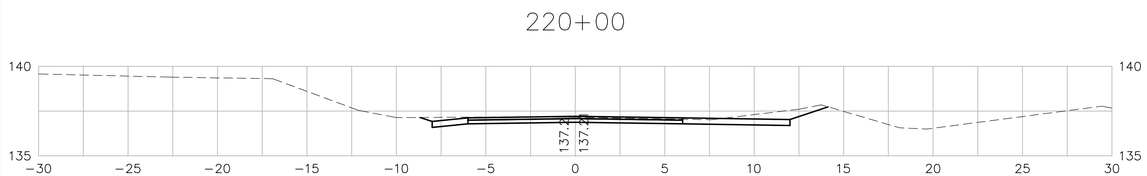
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	125	137
PROJECT FILE NO. 604532				

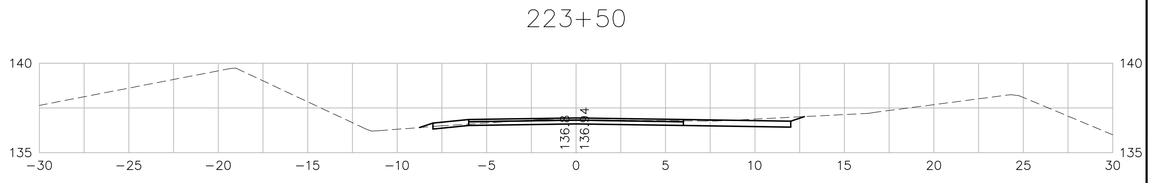
CROSS SECTIONS

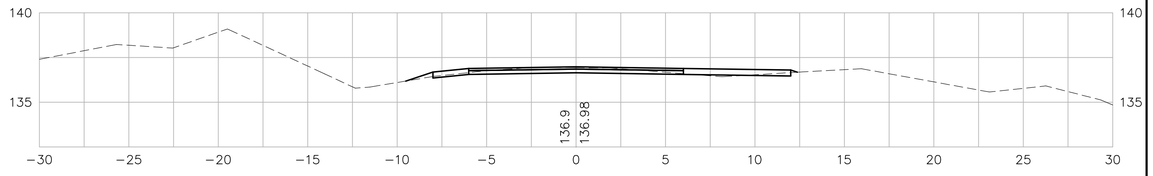


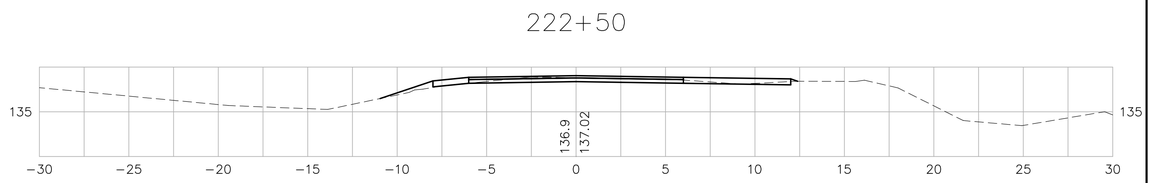


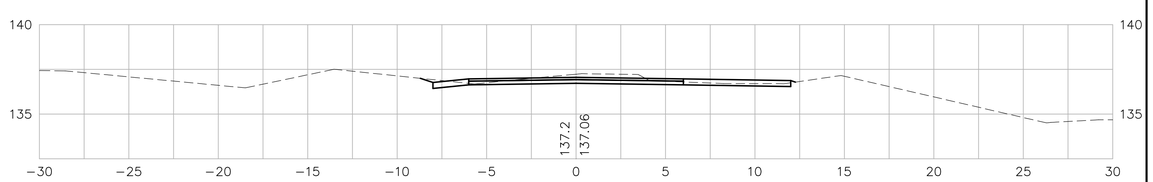












GRAPHIC SCALE
0 2 4 6 8 12 FEET

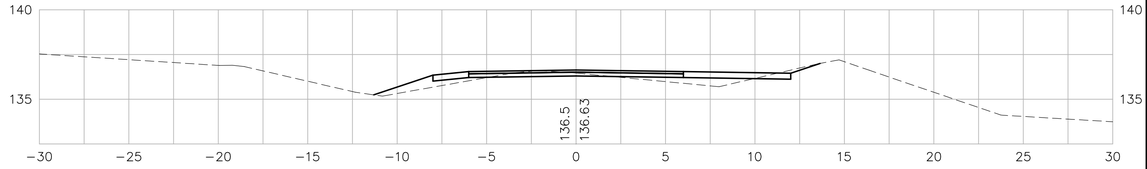
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	126	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

227+50



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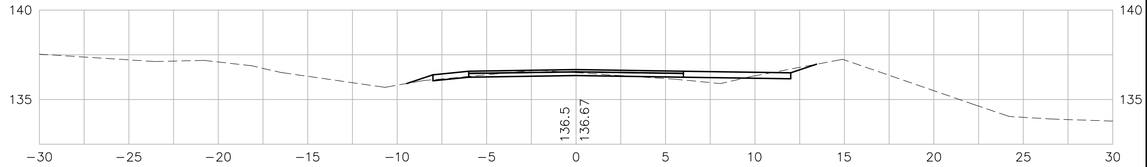

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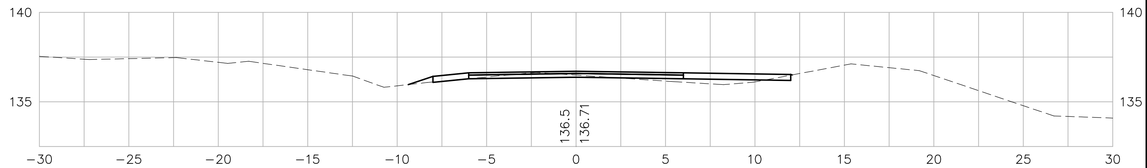
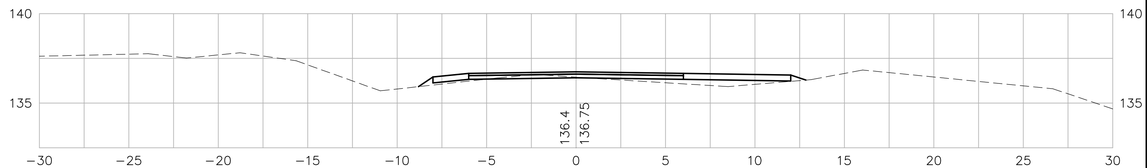


226+00



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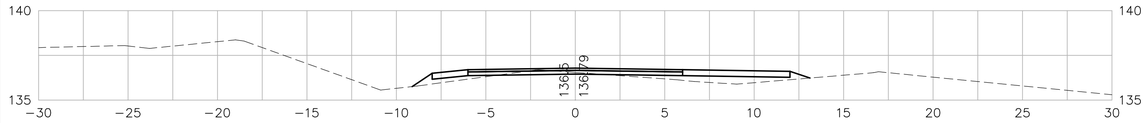

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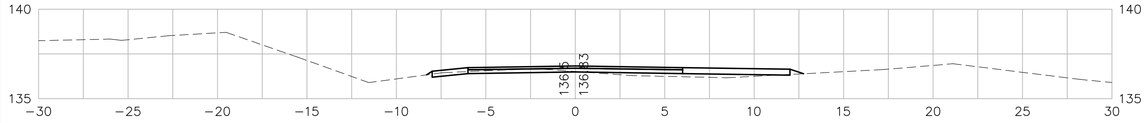
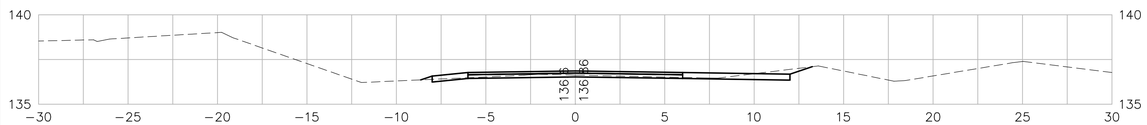
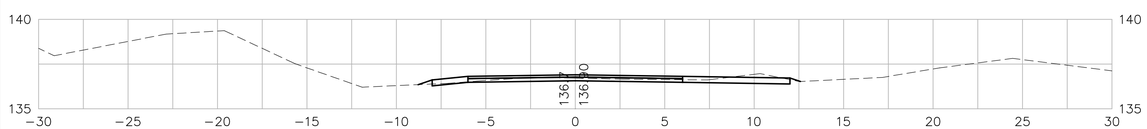


224+50



224+00



GRAPHIC SCALE
0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

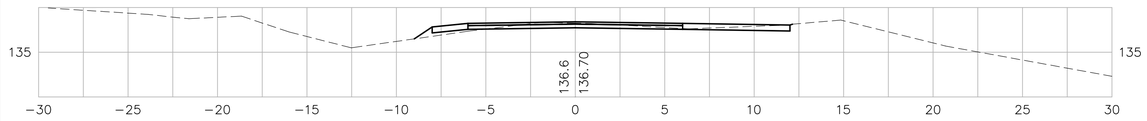
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

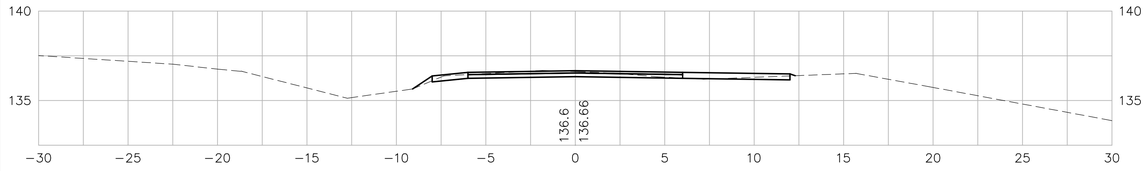
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	127	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

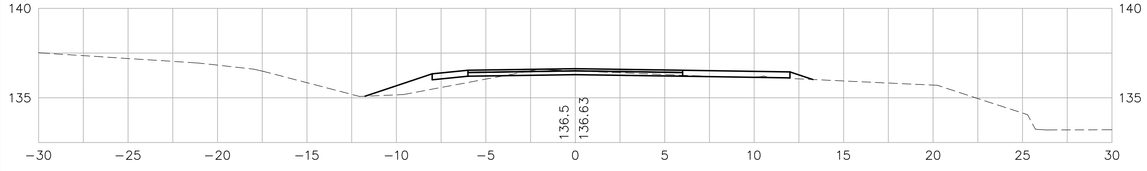
229+50



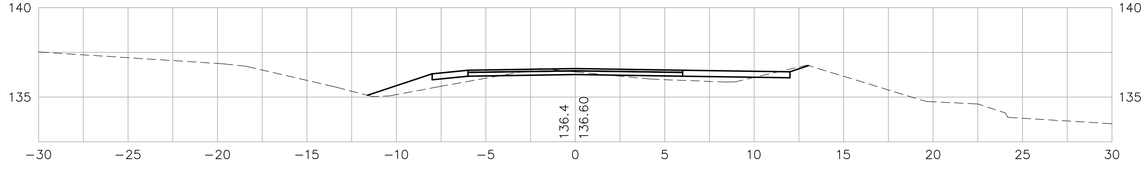
229+00



228+50



228+00



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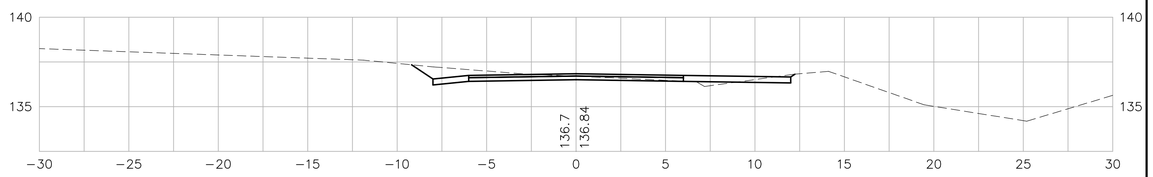
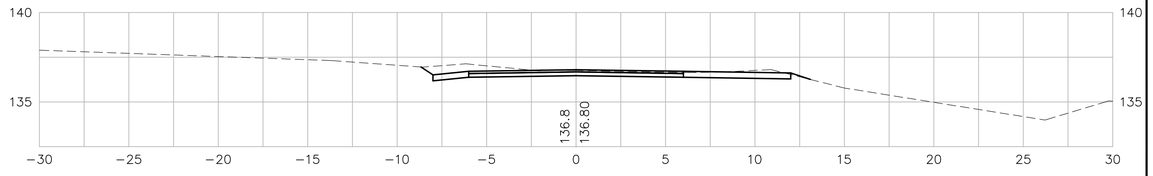


231+00



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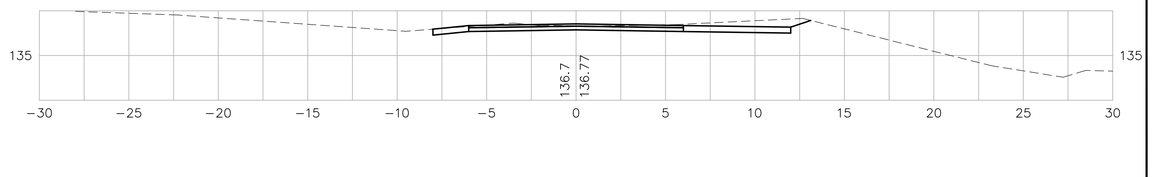

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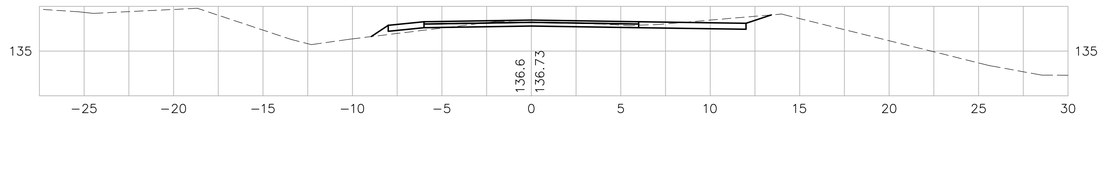


GRAPHIC SCALE

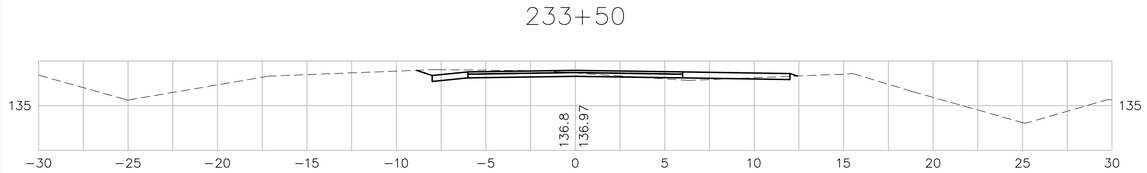
0 2 4 6 8 12 FEET

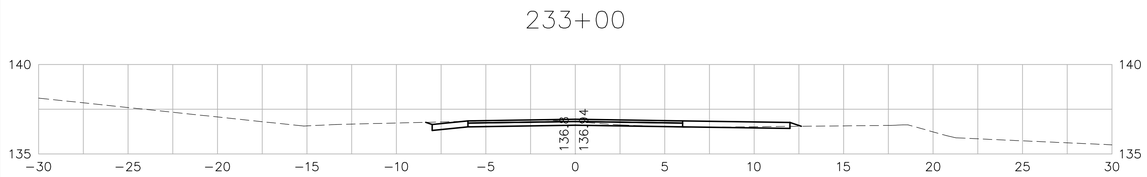
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

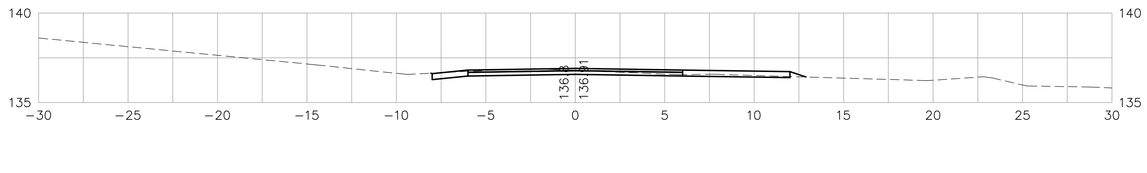
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

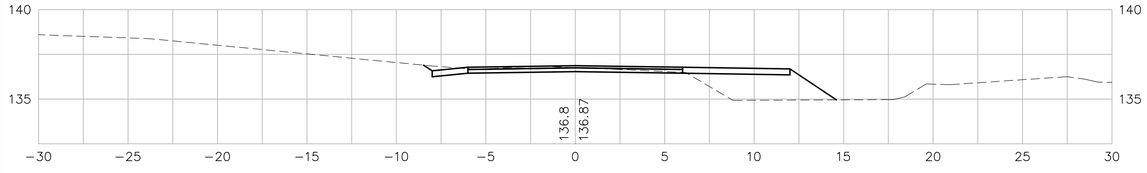
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	128	137
PROJECT FILE NO. 604532				

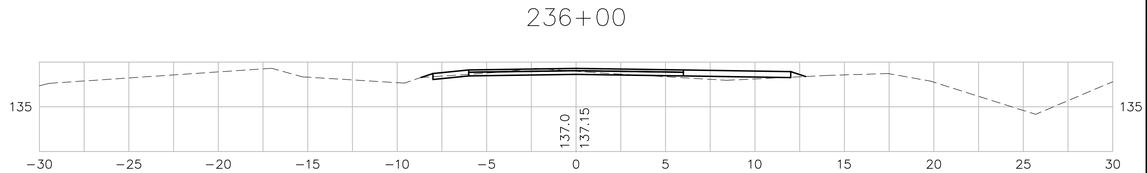
CROSS SECTIONS

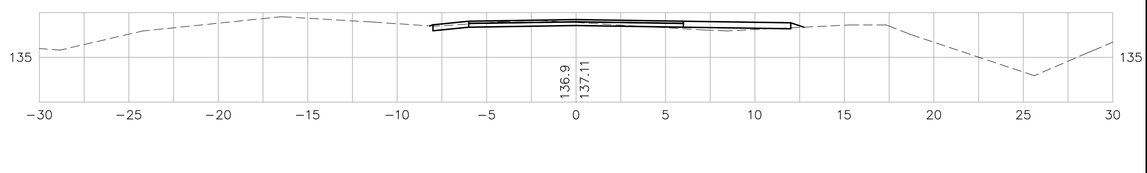


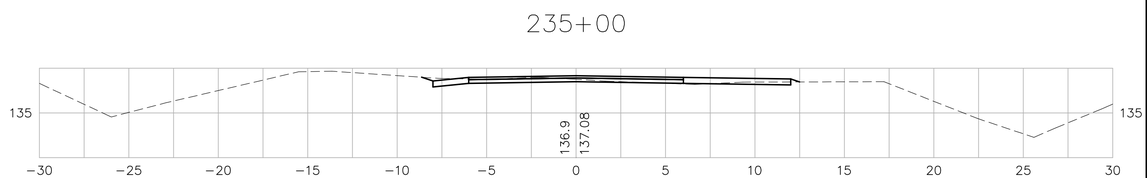


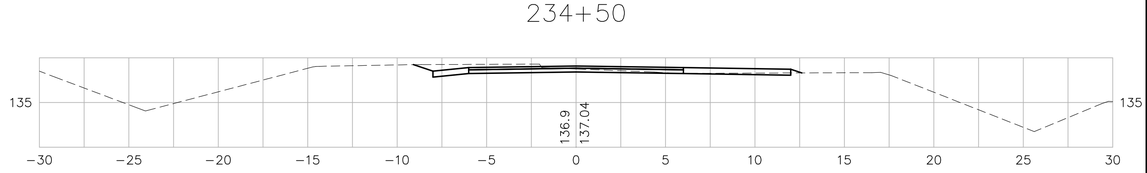


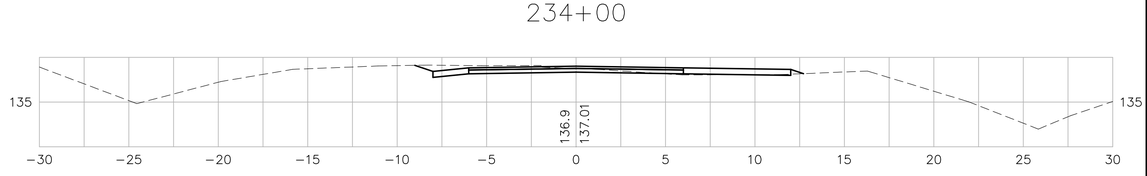












GRAPHIC SCALE
0 2 4 6 8 12 FEET

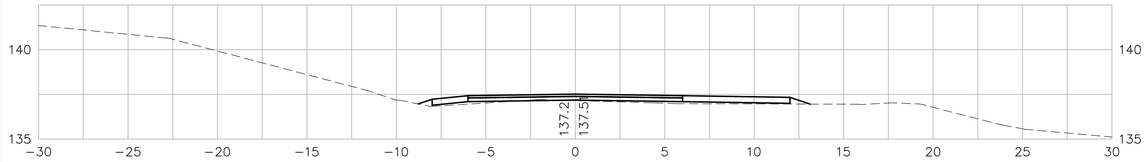
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

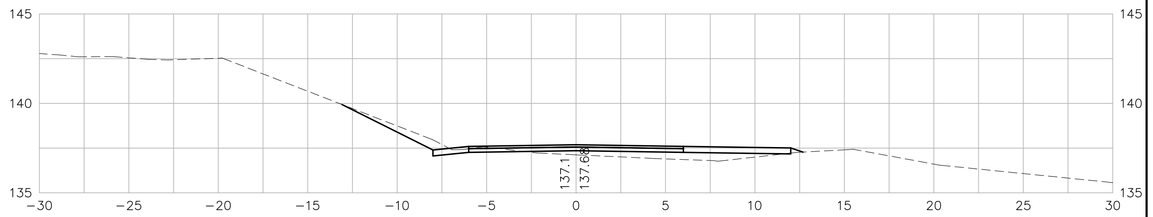
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	129	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

238+00



239+50



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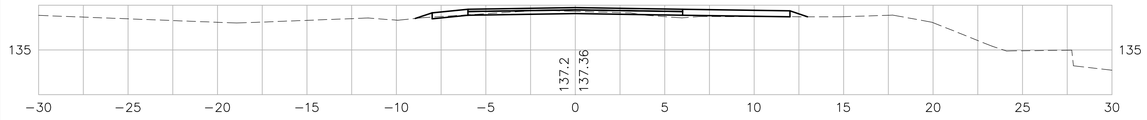

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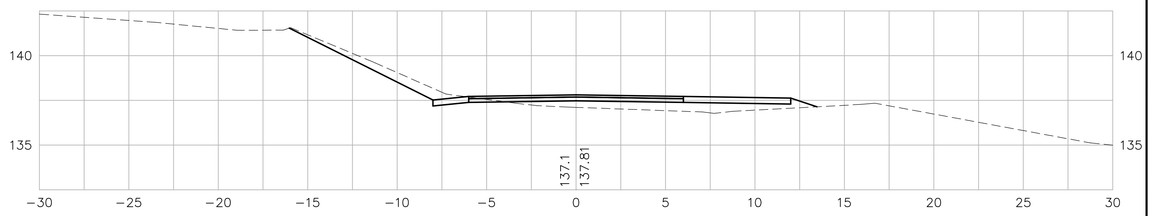

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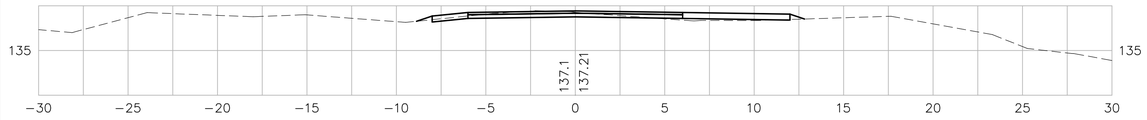
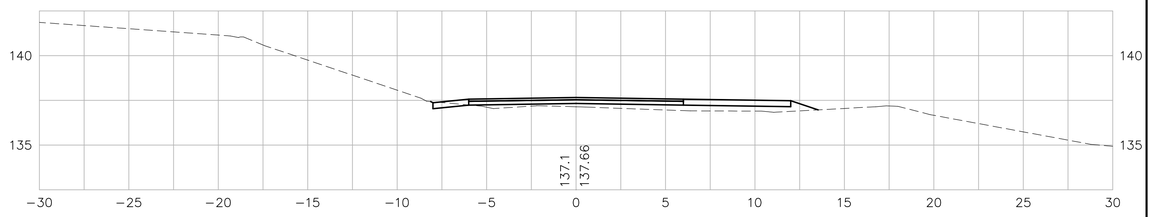


238+50



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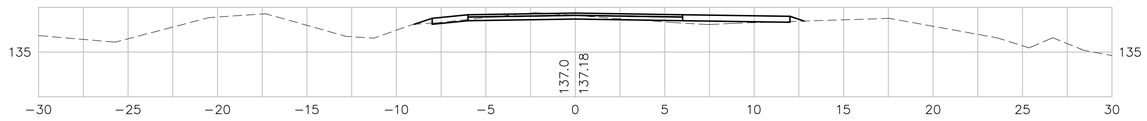


GRAPHIC SCALE
0 2 4 6 8 12 FEET

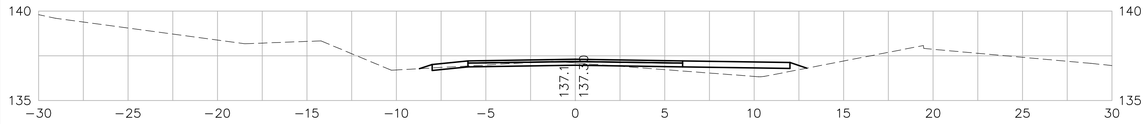
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

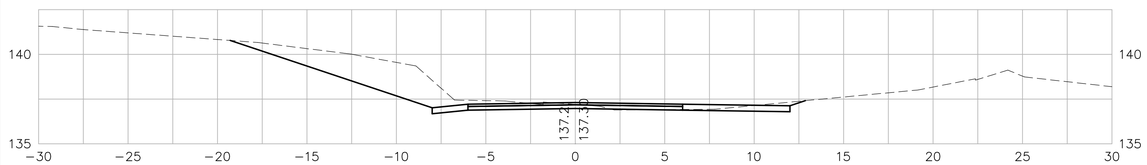
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	130	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

241+50



241+00



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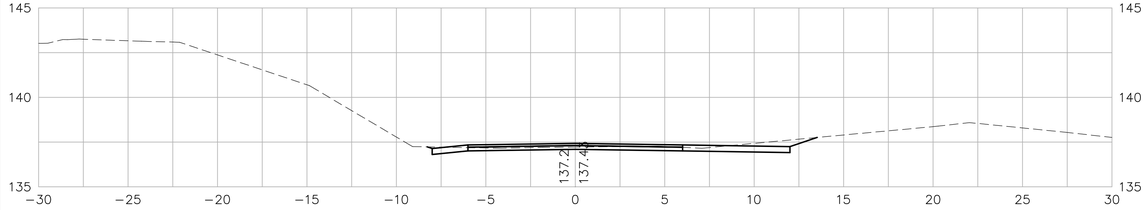

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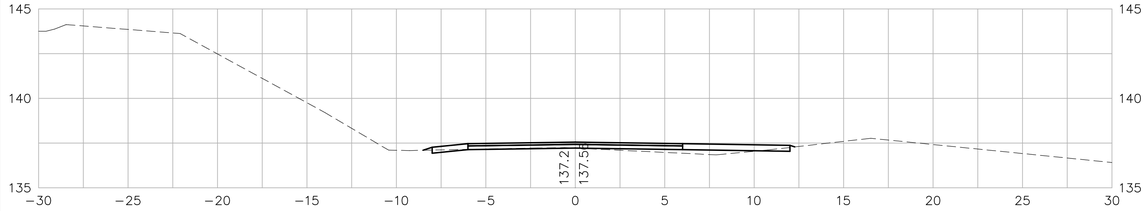
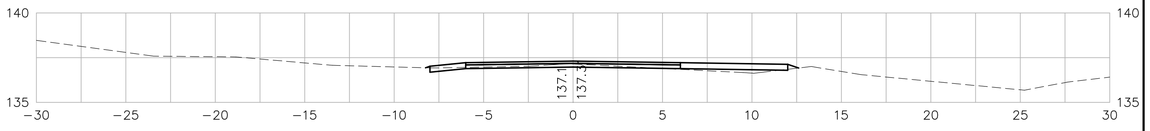


243+50



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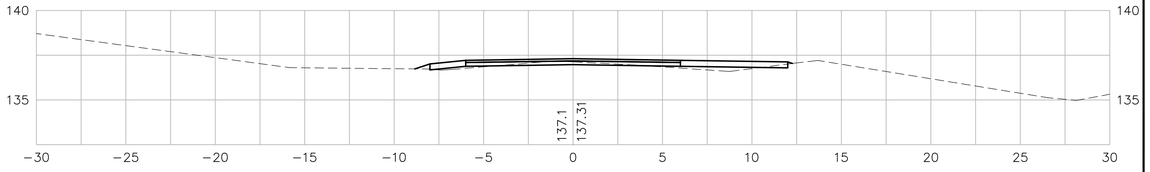
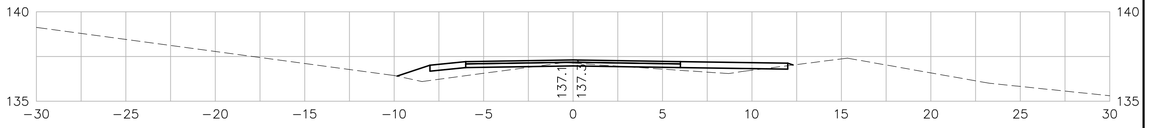
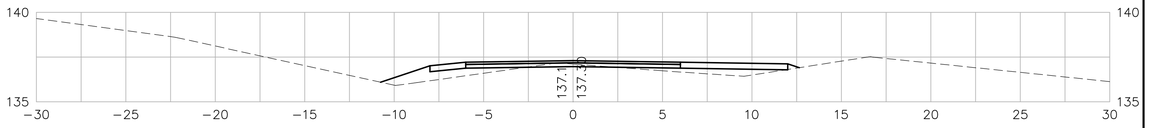


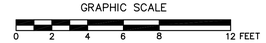
242+50



242+00



GRAPHIC SCALE



IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

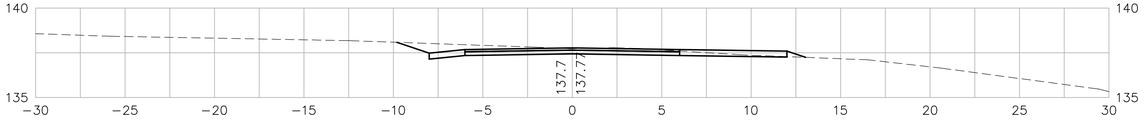
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	131	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

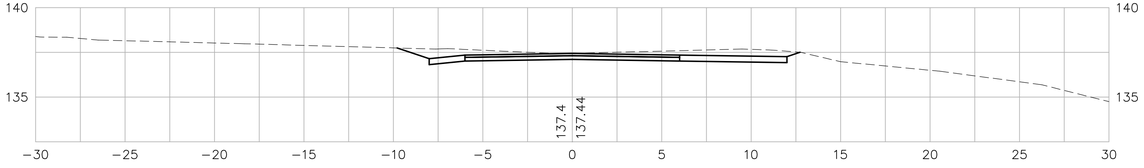
245+50

245+00

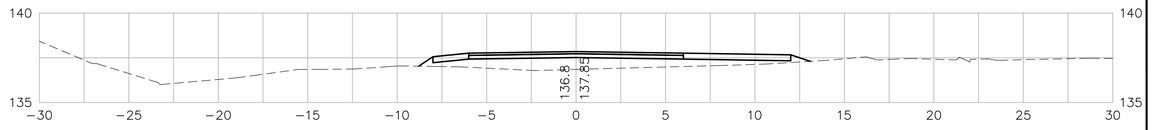
244+50



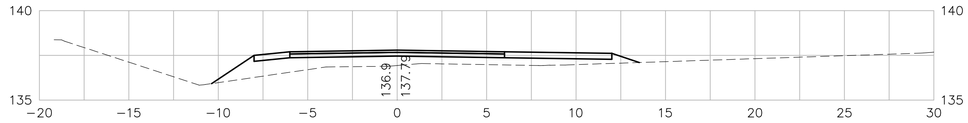
244+00



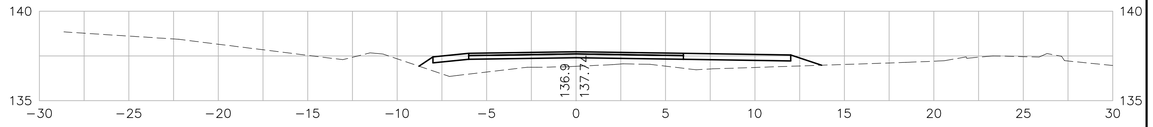
248+00



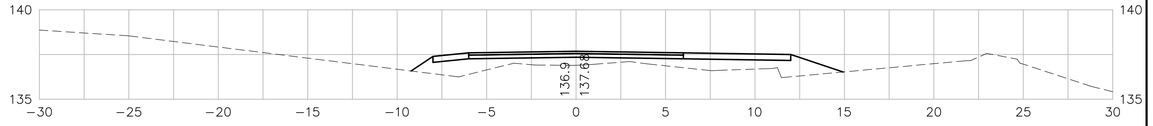
247+50



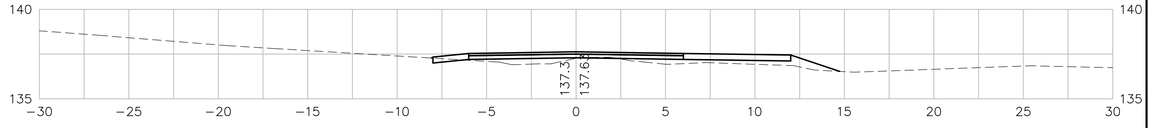
247+00



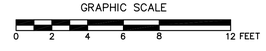
246+50



246+00



GRAPHIC SCALE

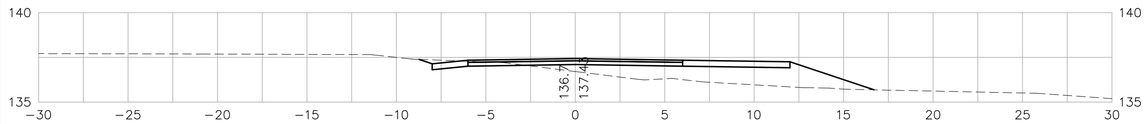


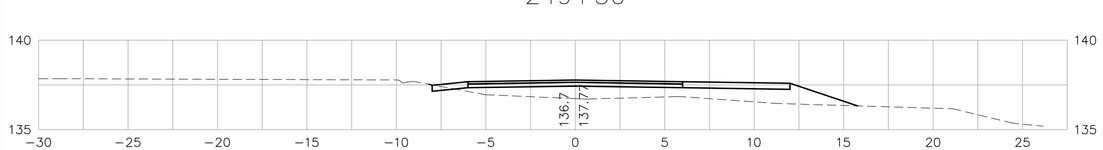
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

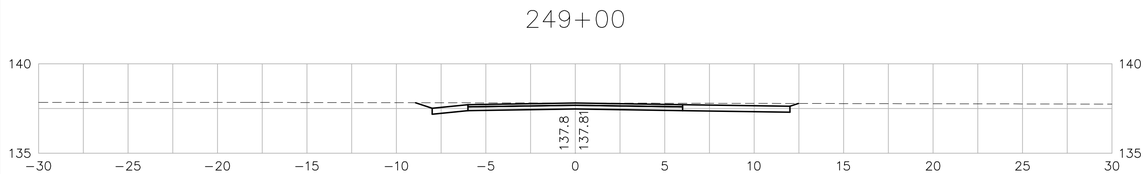
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

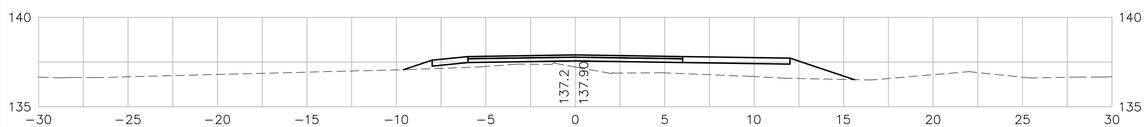
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	132	137
PROJECT FILE NO. 604532				

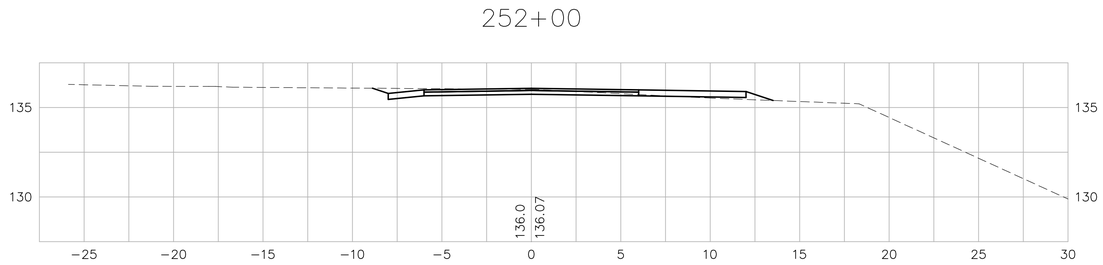
CROSS SECTIONS

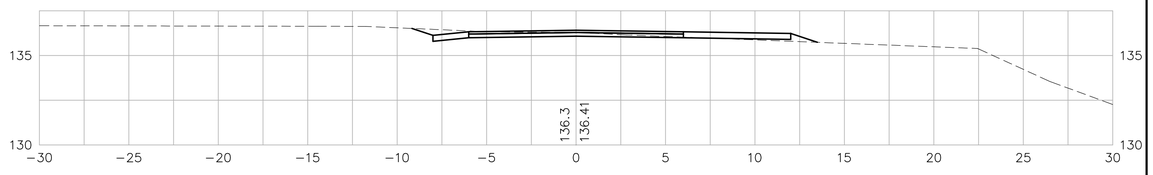


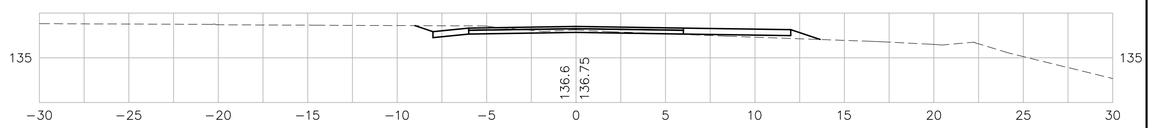


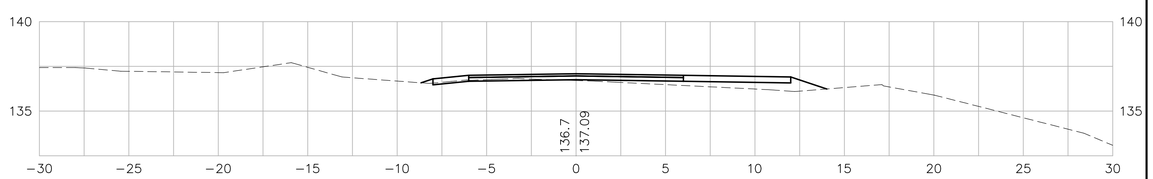












GRAPHIC SCALE
0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

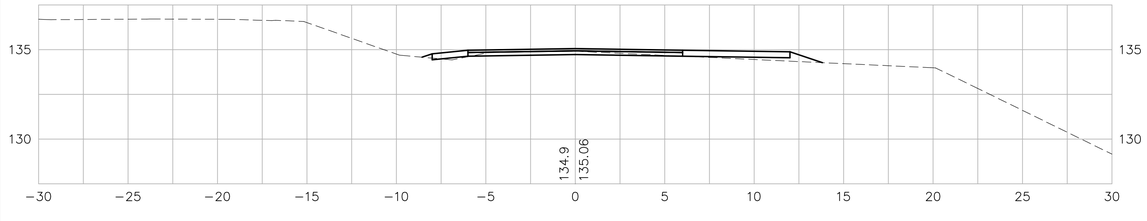
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

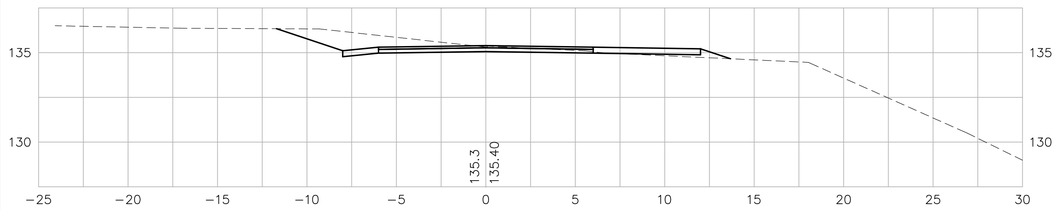
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	133	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

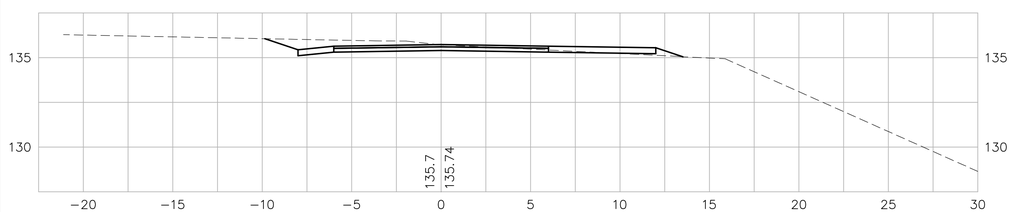
253+50



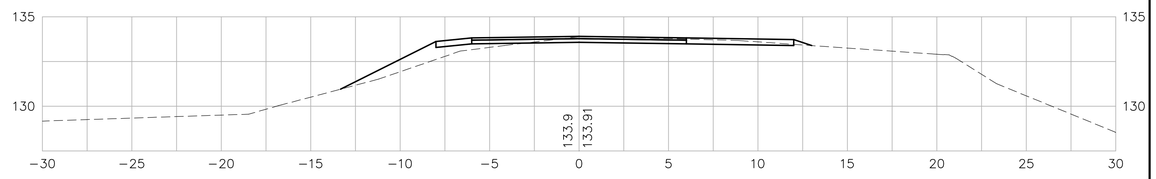
253+00



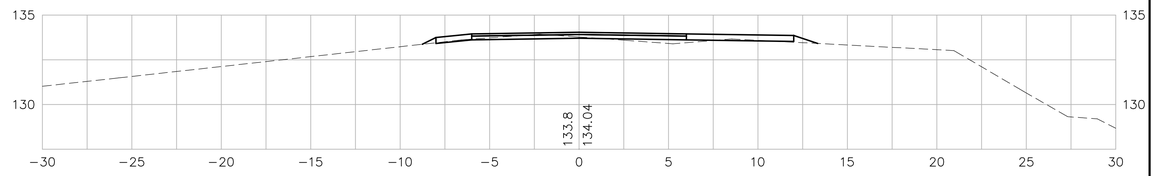
252+50



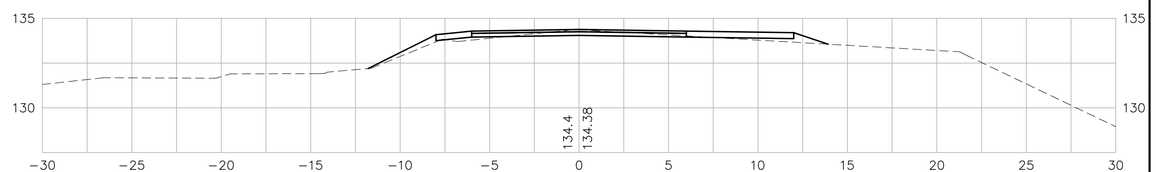
255+50



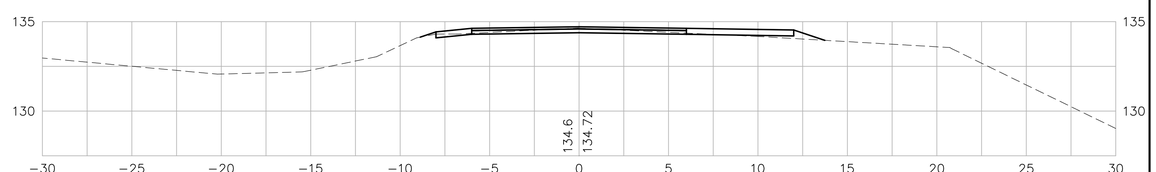
255+00



254+50



254+00



GRAPHIC SCALE

0 2 4 6 8 12 FEET

IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

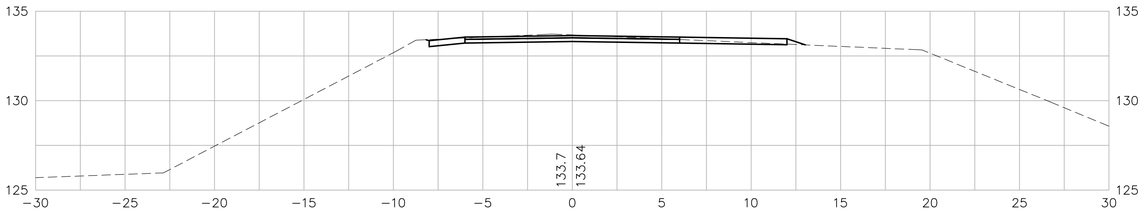
WESTFORD, CARLISLE & ACTON

BRUCE FREEMAN RAIL TRAIL PHASE 2A

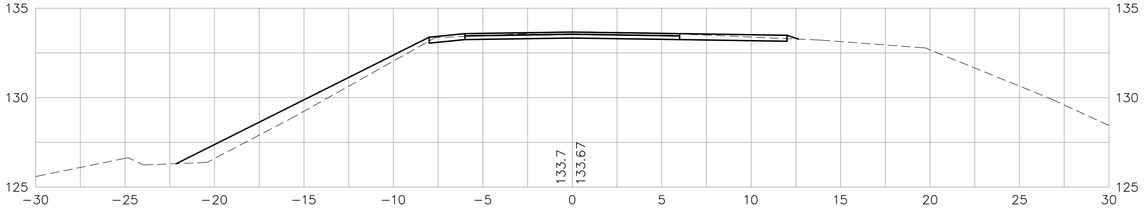
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	134	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

257+00



256+50



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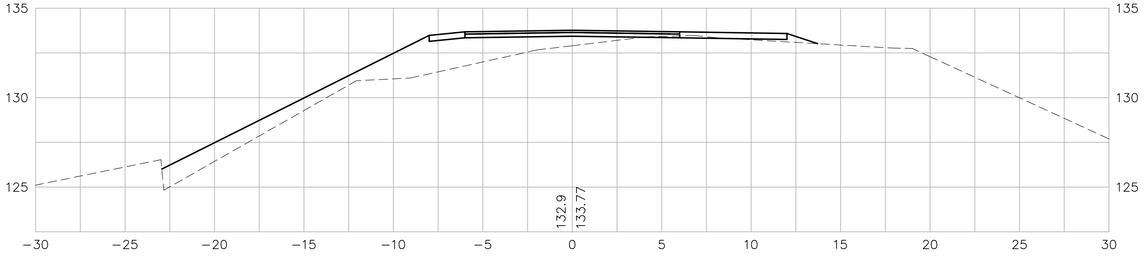
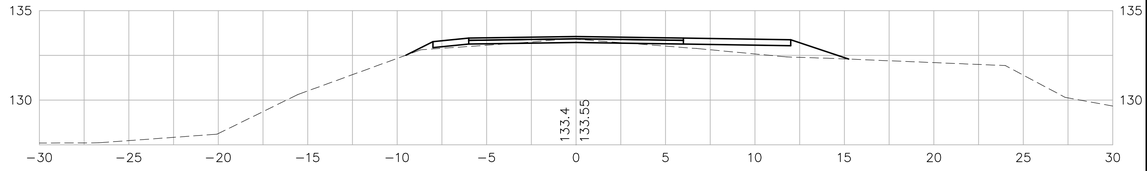
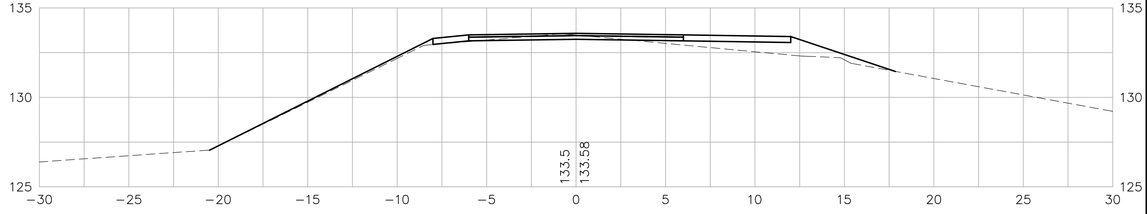


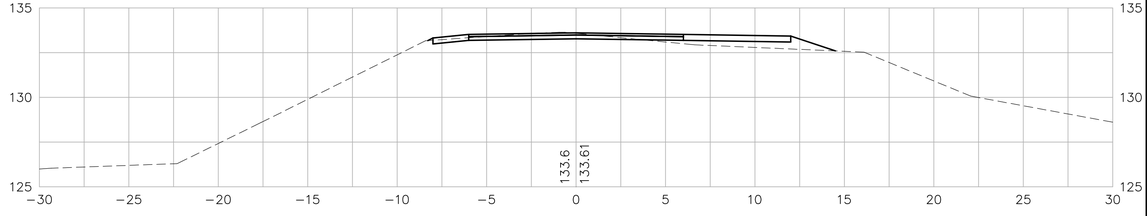
258+50



258+00



257+50



GRAPHIC SCALE

0 2 4 6 8 12 FEET

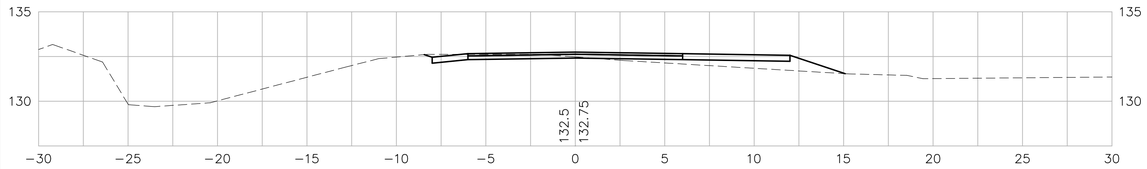
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

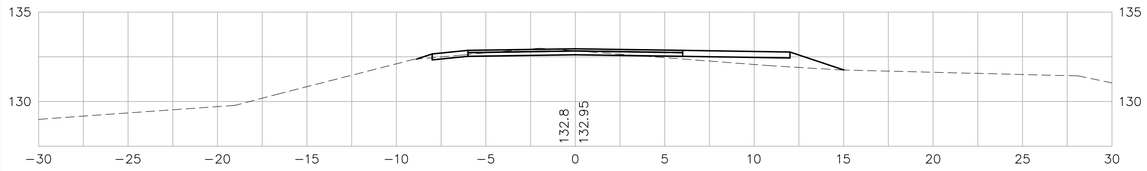
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	135	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

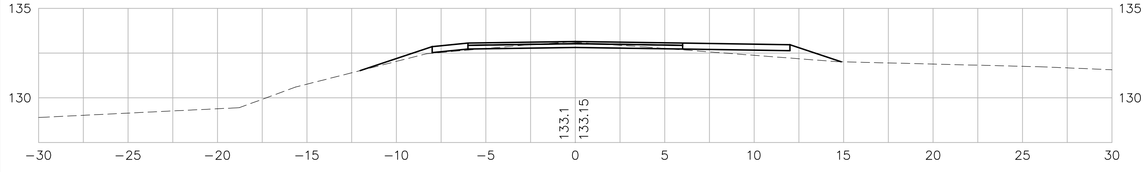
260+50



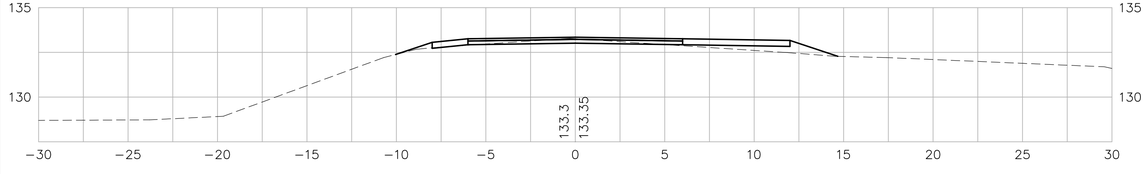
260+00



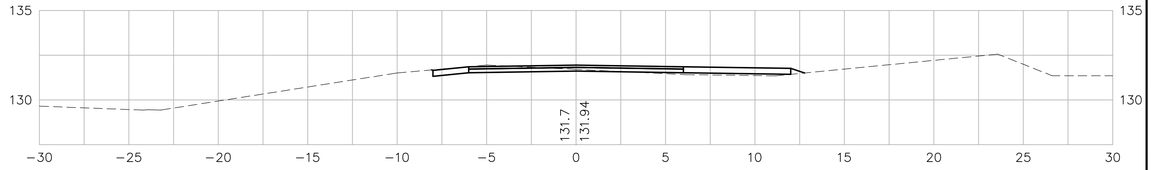
259+50



259+00

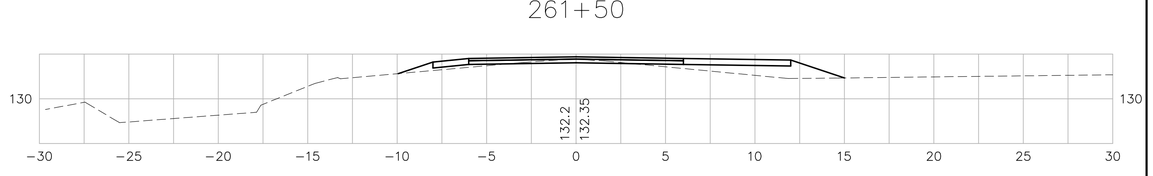


262+50

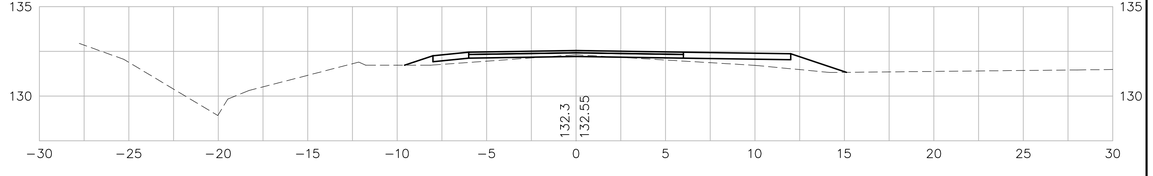


262+00

261+50



261+00



GRAPHIC SCALE

0 2 4 6 8 12 FEET

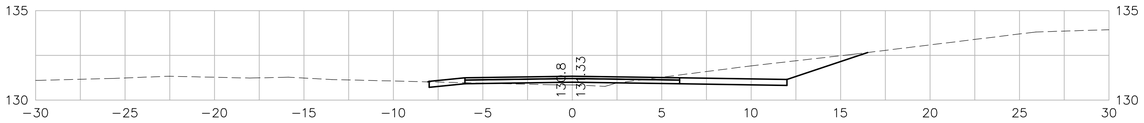
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

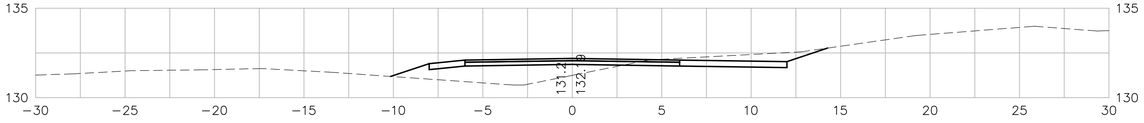
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	136	137
PROJECT FILE NO. 604532				

CROSS SECTIONS

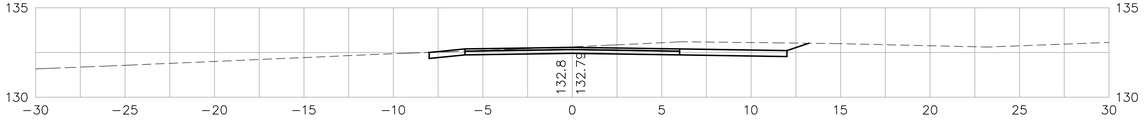
264+50



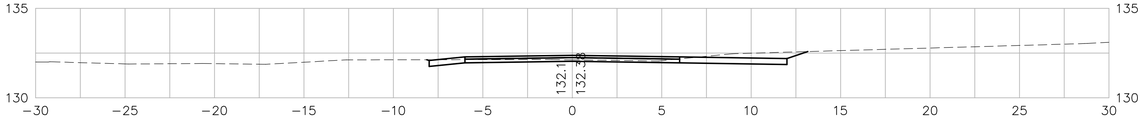
264+00



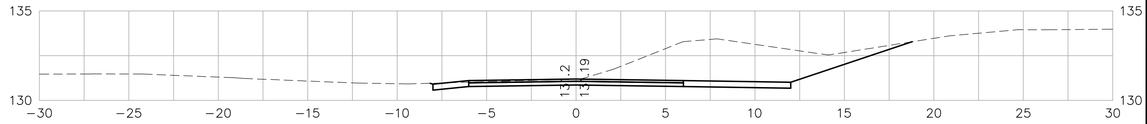
263+50



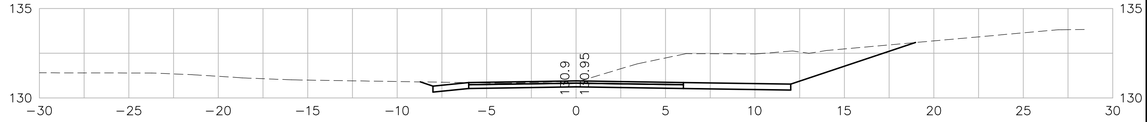
263+00



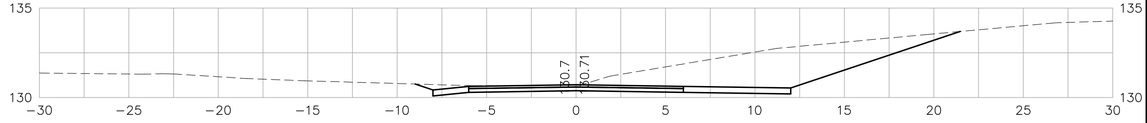
266+50



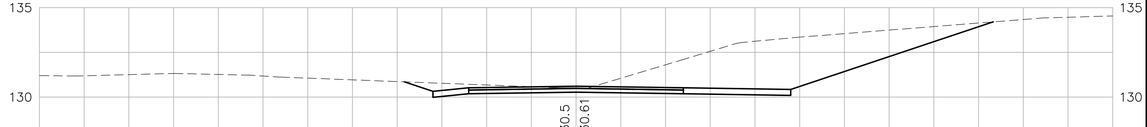
266+00



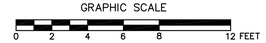
265+50



265+00



GRAPHIC SCALE

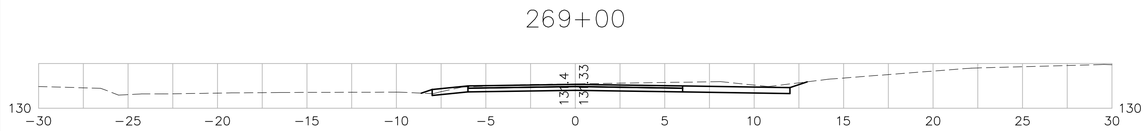


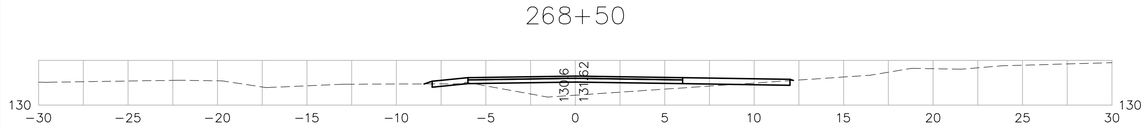
IN CHARGE OF GJH
DESIGNED BY CRB
CHECKED BY GJH
DRAWN BY CRB
CHECKED BY GJH

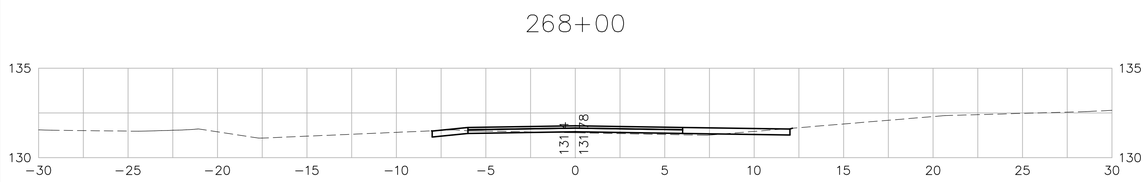
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

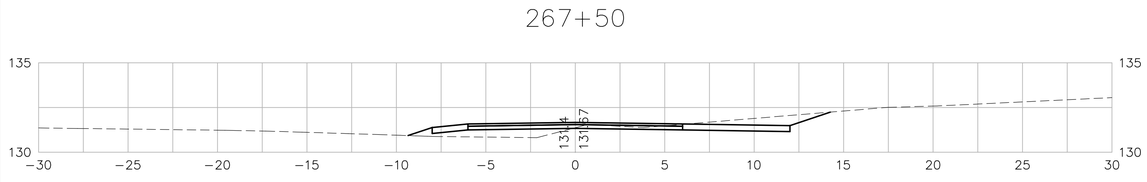
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS	FED. AID	2010	137	137
PROJECT FILE NO. 604532				

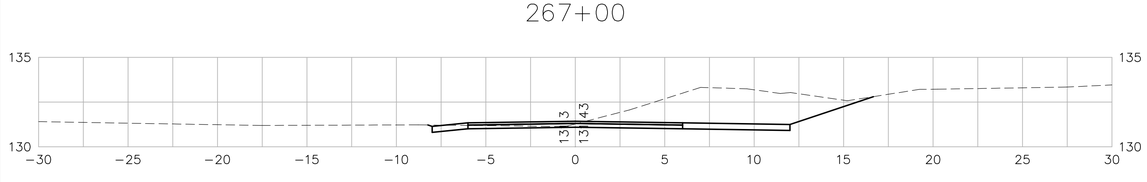
CROSS SECTIONS

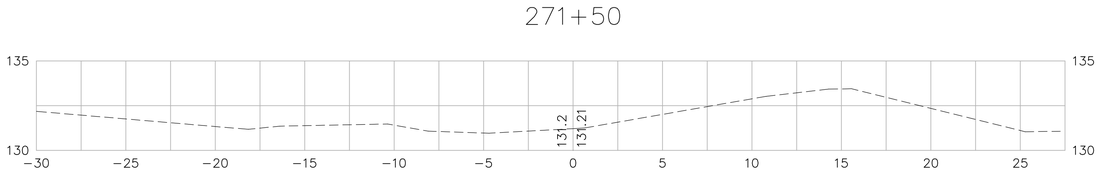


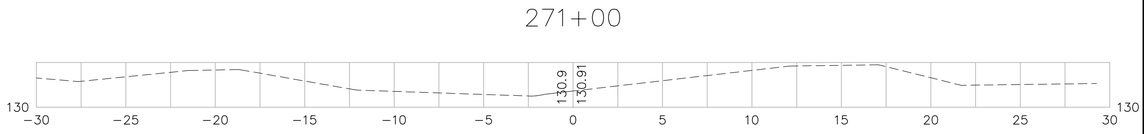


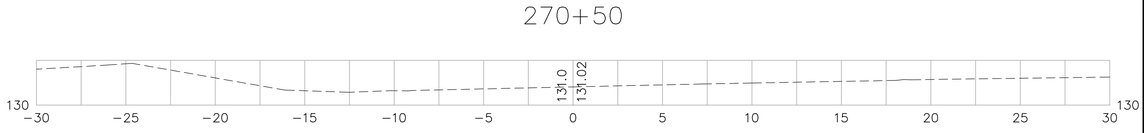


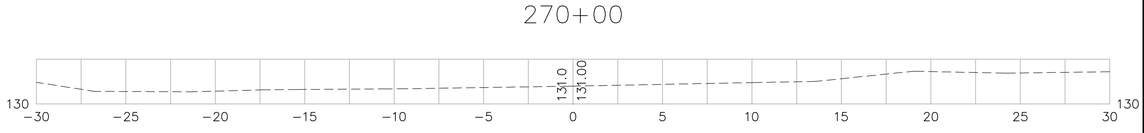


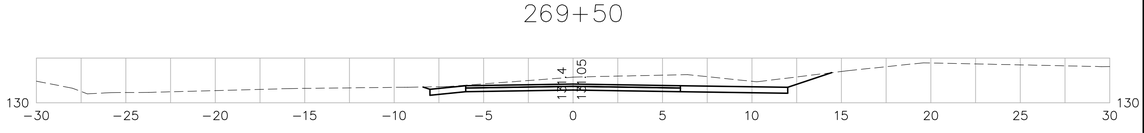












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