ID: U-4412

CONTRACT: C203036

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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81,82	SOIL SAMPLE RESULTS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 35022.1.1 F.A. PROJ. STP-1184(1)

COUNTY HAYWOOD

PROJECT DESCRIPTION WAYNESVILLE - SR 1184 (HOWELL MILL ROAD) FROM US 276 (RUSS AVE) TO US 23 BUSINESS (ASHEVILLE HWY)

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHTS.
N.C.	U-4412	1	82

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
35022.1.1	STP-1184(1)	P.E.
		R/W & UTIL.

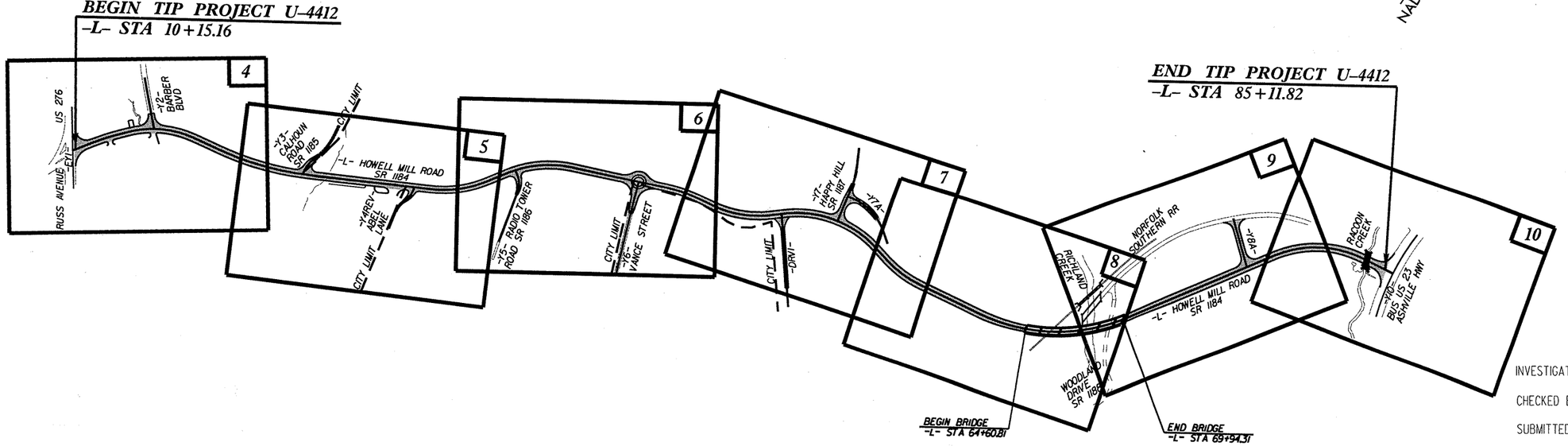
CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NAD 83/95



PERSONNEL
MM HAGER
DC ELLIOTT
C COFFEY
R CHILDERS

INVESTIGATED BY JC KUHNE

CHECKED BY WD FRYE

SUBMITTED BY JC KUHNE

DATE 2/5/09

DRAWN BY: JT WILLIAMS JC KUHNE

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NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA LICENSED SEAL 1878 GEOLOGIST JODY KUHNE

PROJECT REFERENCE NO.	SHEET NO.
U-4412 35022.1.1	2 OF 82

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING # 10 # 40 # 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL - LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL - PLASTIC LIMIT		
OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW - PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 - DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT, CPT, DPT, DMT, VST, PMT - TEST BORING
- AUGER BORING
- CORE BORING
- MW - MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF - SPT REFUSAL

SAMPLE DESIGNATIONS
S - BULK SAMPLE
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE
RS - ROCK SAMPLE
RT - RECOMPACTED TRIAXIAL SAMPLE
CBR - CALIFORNIA BEARING RATIO SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [X] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: -NA-

ELEVATION: FT.

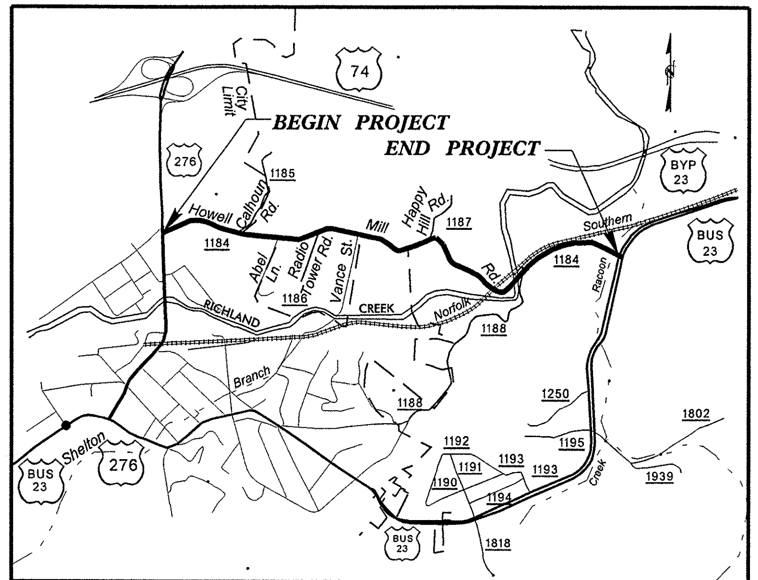
NOTES:

REVISED 02/23/06

09/08/

TIP PROJECT: U-4412

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Symbology Sheet
See Sheets 1-C thru 1- For Control Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HAYWOOD COUNTY

LOCATION: ***WAYNESVILLE - SR 1184 (HOWELL MILL ROAD) FROM US 276 (RUSS AVENUE) TO US 23 BUSINESS (ASHEVILLE HWY)***

TYPE OF WORK: ***GRADING, DRAINAGE, PAVING, CULVERT AND STRUCTURE***

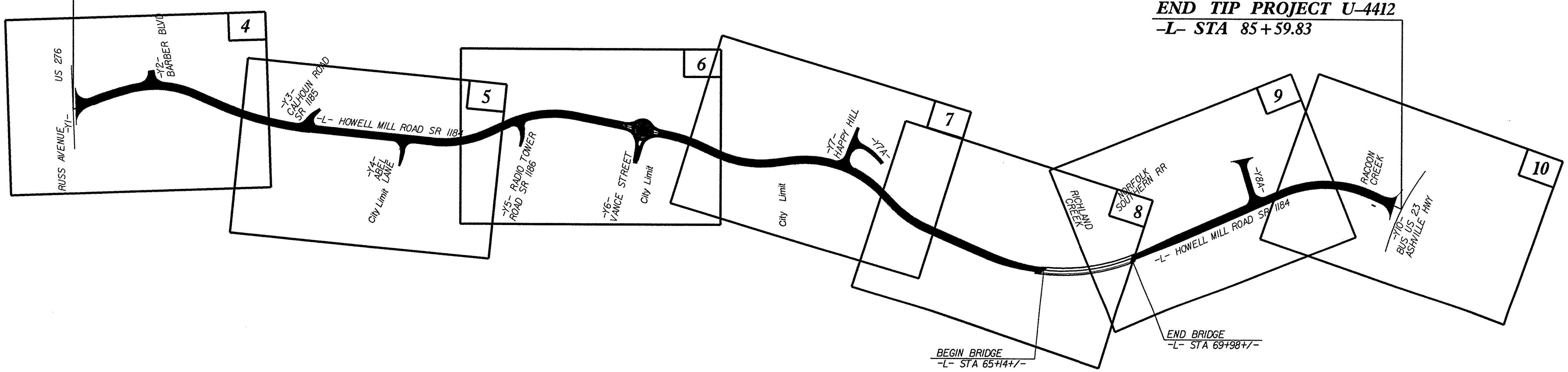
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4412	2A	82

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
35022.1.1	STP-1184(1)	P.E.

NAD 83/95

BEGIN TIP PROJECT U-4412
-L- STA 10+00.00

END TIP PROJECT U-4412
-L- STA 85+59.83



NOTE:
1. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD .
2. A PORTION OF THE PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF WAYNESVILLE.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2012 = 6334
ADT 2032 = 9297
DHV = 10 %
D ≐ 55 %
T = 5 % *
V = 40 MPH
FUNC. CLASS. = URBAN COLLECTOR
* TTST 2% DUAL 3%

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-4412	=	1.34 MI
LENGTH OF STRUCTURE TIP PROJECT U-4412	=	0.09 MI
TOTAL LENGTH OF TIP PROJECT U-4412	=	1.43 MI

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JANUARY 15, 2010

LETTING DATE:
JANUARY 17, 2012

GARY LOVERING, PE
PROJECT ENGINEER

ANTHONY C. WEST
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE OF NORTH CAROLINA ★ DEPARTMENT OF TRANSPORTATION

P.E.
STATE HIGHWAY DESIGN ENGINEER

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

February 2, 2009

STATE PROJECT: U-4412, 35022.1.1

COUNTY: Haywood

DESCRIPTION: Waynesville - SR 1184 (Howell Mill Road) from US 276 to US 23 Business (Asheville Highway)

SUBJECT: Geotechnical Report – Inventory

PROJECT DESCRIPTION

The project consists of widening 1.3 miles of existing 2-lane to improved 2-lane. Widening occurs generally along existing alignment with curve straightening from Stations 10+00 to 45+00. Stations 45+00 to 85+60 propose realignment roughly along the south margin of the existing corridor to tie into US 23 at the current location. A new bridge from Stations 65+14 – 69+98 will carry the alignment over Norfolk Southern Railroad and a large cut section is proposed from Stations 69+98 to 77+50.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

STRUCTURES

The bridge from Stations 65+14 to 69+98 will found in competent saprolite on the west abutment and saprolite/weathered rock on the east abutment. Any interior bents will found in saprolite and alluvial soils, no rock outcrops are present in the footprint. The bridge investigation and recommendations are not part of this inventory and will be addressed at a later date.

A retaining wall is proposed from Stations 24+25 to 26+40, 36' RT. The maximum height is approximately 5'. The Structure Inventory for this wall will be provided in a separate report.

Two assumed culvert extensions at Station 13+75 LT and 84+00 RT were investigated by driving sounding rods into the existing alluvium.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-250-4088
FAX: 919-250-4237

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

POTENTIALLY UNSUITABLE SUBSURFACE CONDITIONS

Artificial Fill - Areas of artificial fill were encountered at Stations 15+00 – 27+00 RT, 50+00 – 62+00 RT and 78+00 – 85+00 –L-. These areas are sufficiently capable of bearing the proposed roadway, no unsuitable materials were noted at the surface or in borings, but complete knowledge of the materials in private or commercial fills cannot be known. The entire sections are not suspect but small areas will probably require geotextile and select material replacement due to the fill expansion.
The fill area from 50+00 – 62+00 RT is the site of older and current junkyard/salvage operations. Petroleum product was noted in borings and soil samples taken along this section.

Alluvium - Loose to medium dense alluvial soils exist in the vicinity of Stations 15+00 – 27+00 RT and 55+00 – 62+00 RT. The entire sections are not suspect but small areas will probably require geotextile and select material replacement due to the fill expansion.

GROUNDWATER

Groundwater is noticeably absent over most of the project. High groundwater exists in alluvium in the wall borings at the following station interval:

24+25 – 26+40 RT

Groundwater can be expected within 5' of the surface from Stations 55+00 – 62+00.

PHYSIOGRAPHY AND GEOLOGY

U-4412 connects two 4-lane commercial corridors. The alignment traverses moderately rolling terrain with suburban to rural habitation.

The entire corridor is underlain by migmitized biotite gneiss, dark massive rock whose high mica content generates silty sand to sandy silt soils.

SOIL PROPERTIES

Soils are well developed throughout the project. Sparse rock outcrop was noted along the corridor with weathered rock only noted in the deepest cut borings. The high biotite content of the bedrock produces silty soils which mostly range from AASHTO A-2-4 to A-4. The long alluvial sections as noted under Areas of Special Geotechnical Interest contain lenses of A-5 to A-7 material within the sandy silt and silt deposits.

ROCK PROPERTIES

Rock is scarce, with a few outcroppings in the vicinity of the proposed bridge. The bridge foundations are likely to encounter rock but cut areas are only expected to grade

into weathered rock. The culvert extensions will be in gravel, cobble and silty alluvium which will not allow for bottomless culverts.

GROUNDWATER

As described in Areas of Special Geotechnical Interest, groundwater is generally not present in cuts or foundation areas. The alluvial areas noted will have high groundwater but are not considered to be compressive soils.

GEOTECHNICAL DESCRIPTIVE ANALYSIS

Stations 10+00 to 22+00 – The alignment will consist of moderate fill on the right and cut section on the left. The cut section will be below a large commercial parking lot at the top of the cut. The 2:1 cut excavation will not interfere with the parking lot fill nor undermine it.

Stations 22+00 to 47+00 – The alignment traverses rolling to flat terrain with low cuts and fills under 5' in competent soils.

Stations 47+00 to 65+00 – The alignment enters this section with a low cut on the left and then enters a new alignment section of high fill over artificial fill and alluvium. This area will contain petroleum product contamination but consists of competent soils for bearing capacity. Some weak areas may be encountered that require soil replacement and geotextile reinforcement since the full spectrum of material in the artificial fill is not known.

Stations 65+00 to 70+00 – Proposed bridge section. Small rock outcrops underneath and near End Bent 2.

Stations 70+00 to 77+00 – The largest cut section on the alignment. New alignment in this section with through-cut in dense soils with weathered rock.

Stations 77+00 to 85+00 – Alignment finishes on low fills over artificial fill and alluvium. The artificial fill has been commercially graded and consists of boulders and cobbles in silty material, generally clean and well compacted. The culvert extension in this area was investigated with sounding rods and showed dense material at 5' in depth with rod refusal at 9' in depth.

Respectfully Submitted,

Jody C. Kuhne

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT: **U-4412** COUNTY: **Haywood** DATE: 12/21/2012 COMPILED BY: BEH SHEET__ OF __ SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +15%		ROCK	SUITABLE	UNSUIT.	TOTAL
-L- 10+15.16	-L- 39+75.00	6,415				6,415	19,312		19,312	22,209	15,794				
-L- 39+75.00	-L- 64+60.81 BEGIN BRIDGE	9,128				9,128	95,821		95,821	110,194	101,066				
-L- 69+94.31 END BRIDGE	-L- 85+11.82	77,971				77,971	10,715		10,715	12,322			65,649		65,649
	SUBTOTAL	93,514				93,514	125,848		125,848	144,725	116,860		65,649		65,649
-Y2- 11+95.00	-Y2- 12+65.14	21				21	247		247	284	263				
-Y3- 11+95.00	-Y3- 13+15.99	537				537	150		150	173			365		365
-Y4REV- 10+38.00	-Y4REV- 11+76.87	7				7	355		355	408	401				
-Y5- 10+20.00	-Y5- 11+55.00	12				12	819		819	942	930				
-Y6- 10+60.00	-Y6- 11+85.00	127				127	469		469	539	412				
	SUBTOTAL	704				704	2,040		2,040	2,346	2,007		365		365
-DRV1- 10+75.00	-DRV1- 14+00.00	3				3	6,718		6,718	7,726	7,723				
-Y7- 11+95.00	-Y7- 14+08.15	67				67	4,395		4,395	5,054	4,987				
-Y7A- 10+10.44	-Y7A- 12+05.00	410				410	768		768	883	473				
-Y8B- 10+11.19	-Y8B- 12+80.01	17,521				17,521	20		20	23			17,498		17,498
	SUBTOTAL	18,001				18,001	11,901		11,901	13,686	13,183		17,498		17,498
-DET1-		356				356	161		161	186			171		171
Parcel 31 (Fill Adjustment)							-3,217		-3,217	-3,700	-3,700				
15% Shrinkage Factor for fill on Parcel 31										483	483				
	SUBTOTAL	356				356	-3,056		-3,056	-3,031	-3,217		171		171
TOTAL		112,575				112,575	136,733		136,733	157,726	128,833		83,682		83,682
REMOVE DETOUR		20				20	112		112	129	109				
LOSS DUE TO CLEARING & GRUBBING		-200											-200		-200
ADDITIONAL UNDERCUT															
ROCK WASTE TO REPLACE BORROW															
ADJUST FOR ROCK WASTE															
WASTE IN LIEU OF BORROW											-83,482		-83,482		-83,482
PROJECT TOTAL		112,395				112,595	136,845		136,845	157,855	45,459				
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT											2,273				
GRAND TOTAL		112,395				112,595	136,845		136,845	157,855	47,732				
SAY		**113,000**									**48,000**				

EST. DDE = 290 CUBIC YARDS

PER GEOTECH RECOMMENDATION, ESTIMATED 500 CUBIC YARDS OF UNDERCUT TO BE USED IN THE DISCRETION OF THE RESIDENT ENGINEER.

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

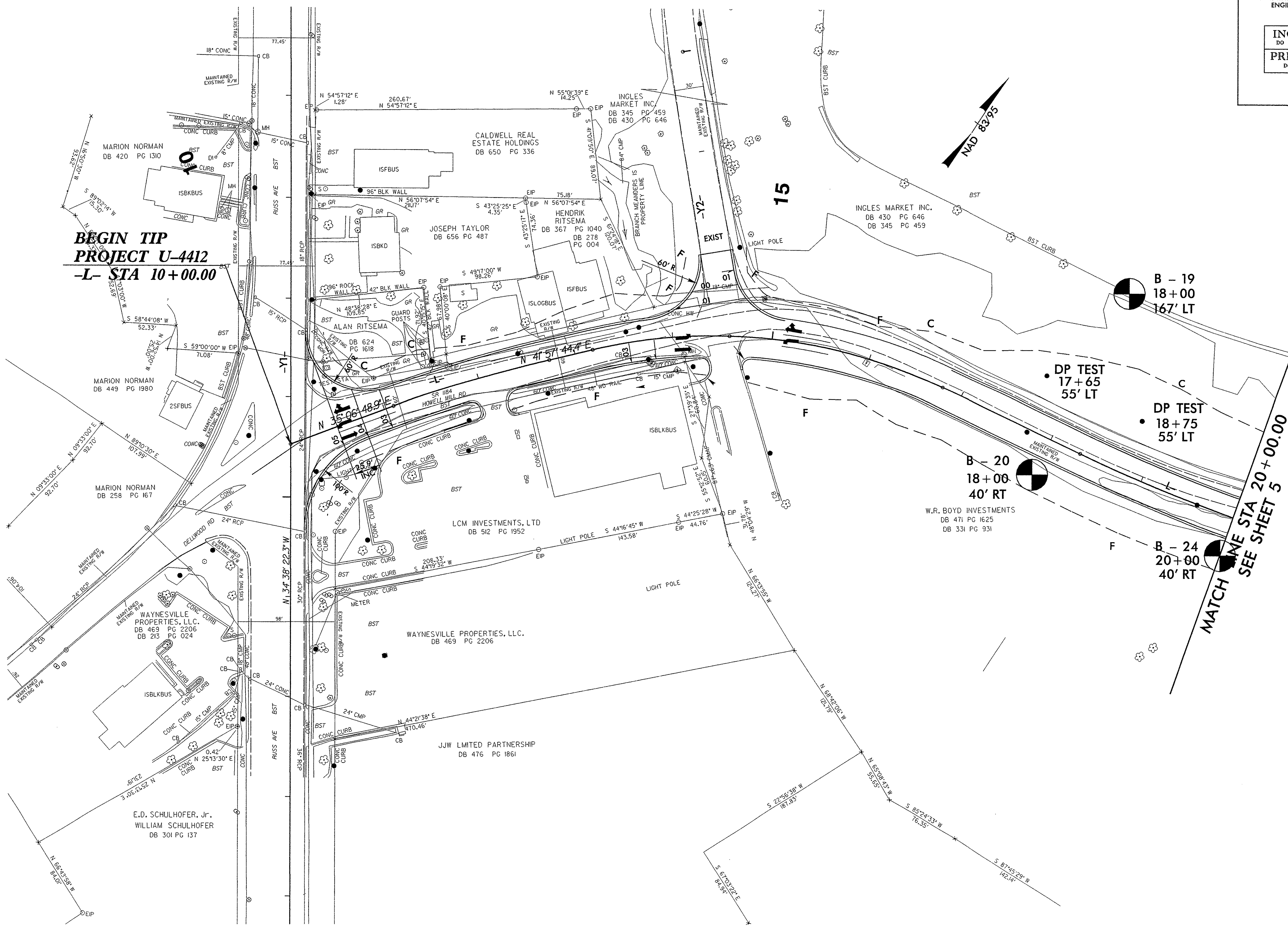
PROJECT REFERENCE NO.	SHEET NO.
U-4412	4 OF 82
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/9

REVISIONS



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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-4412	5 OF 82

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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PRELIMINARY PLANS
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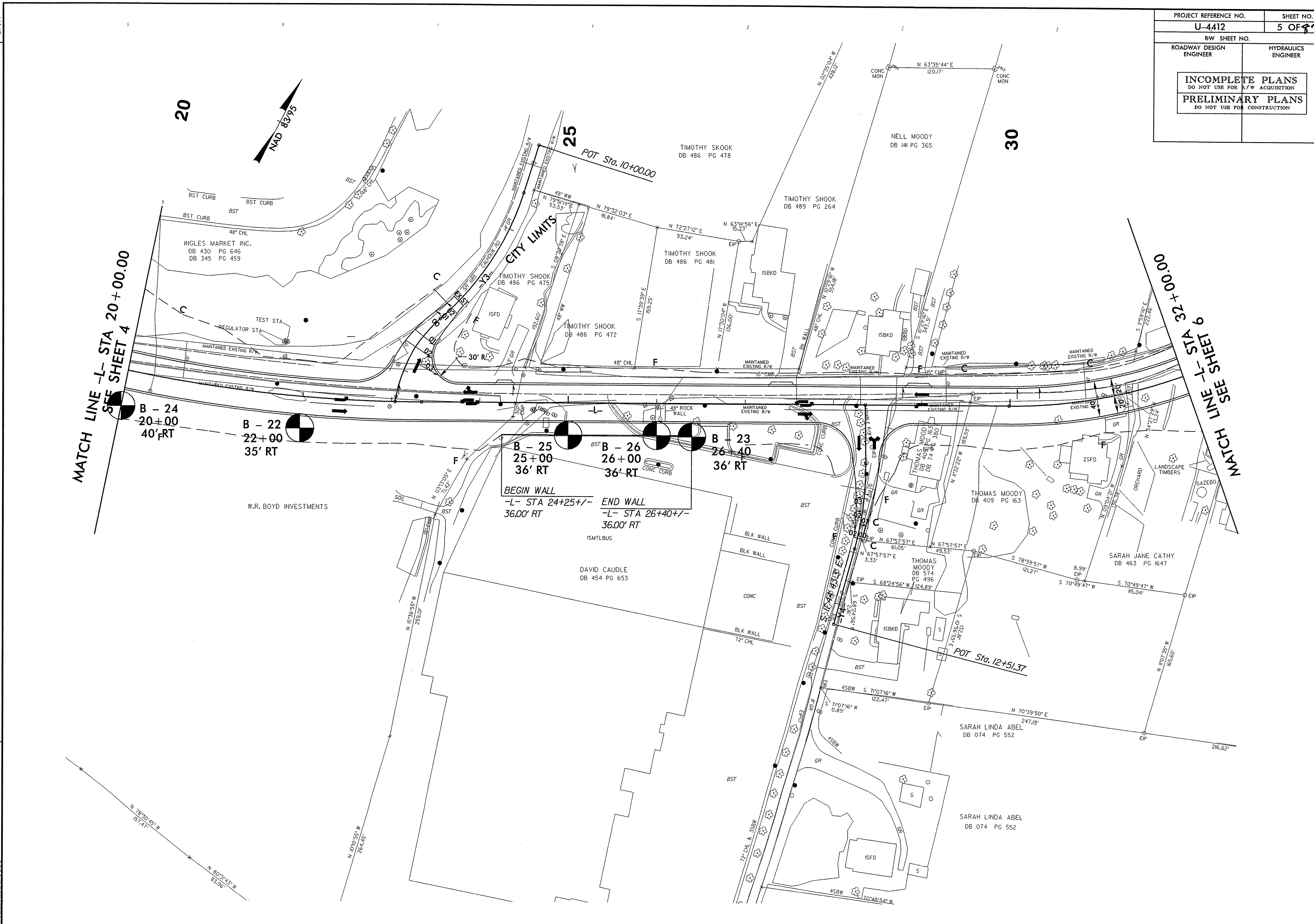

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PROJECT REFERENCE NO.	SHEET NO.
U-4412	6 OF 82
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
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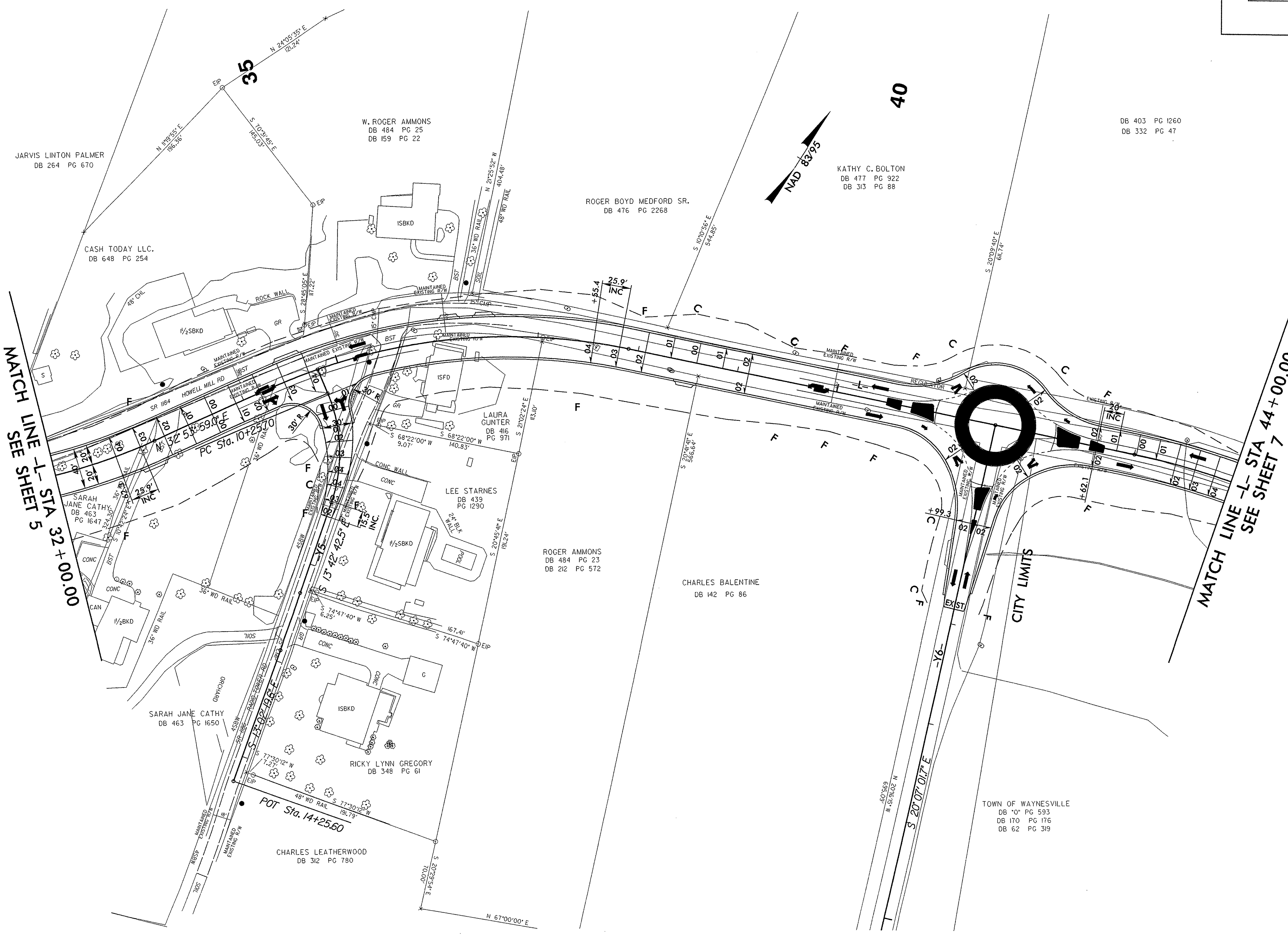
REVISIONS



8/17/9?

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4412	7 OF 82
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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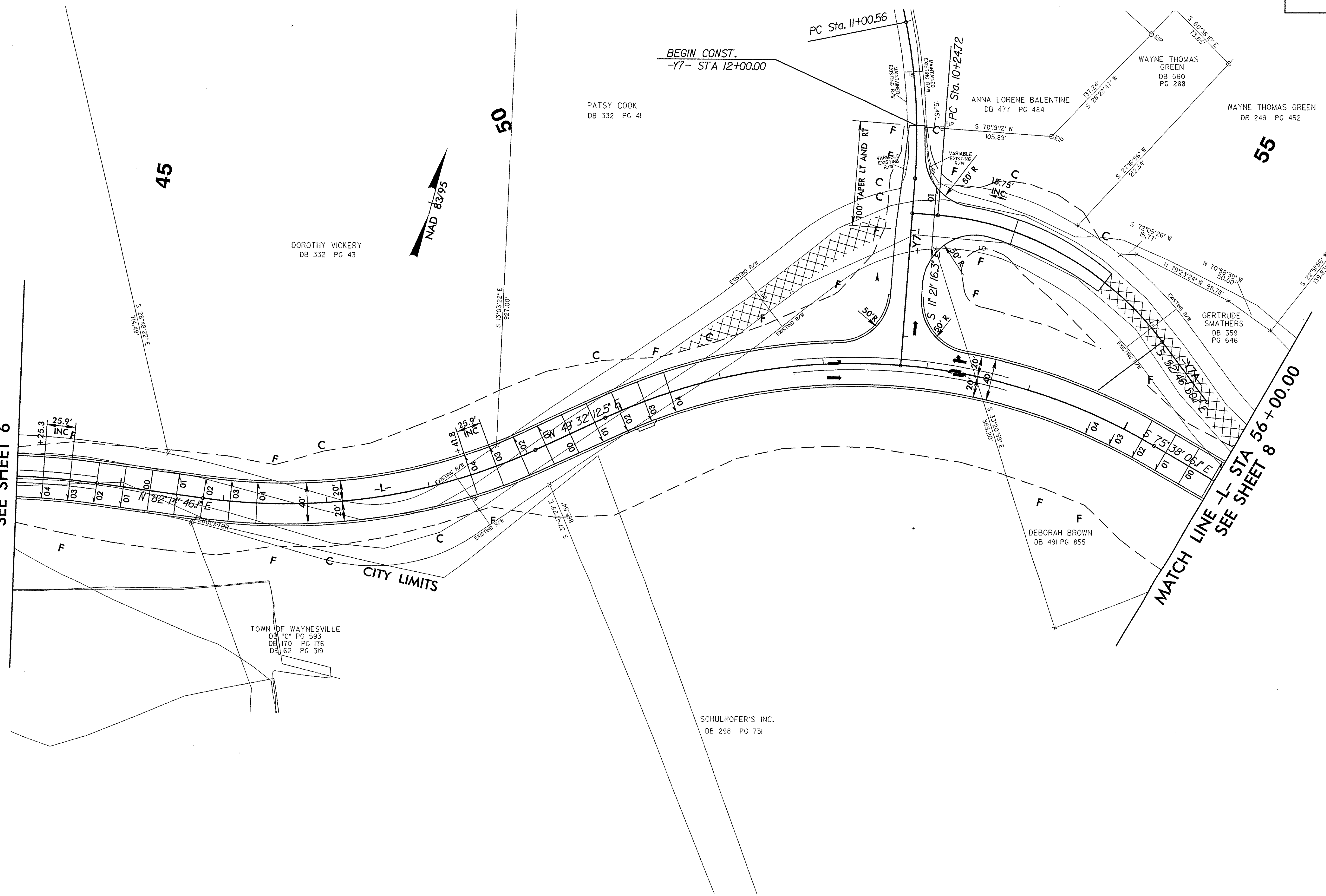

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$$$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-4412	8 OF 82
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
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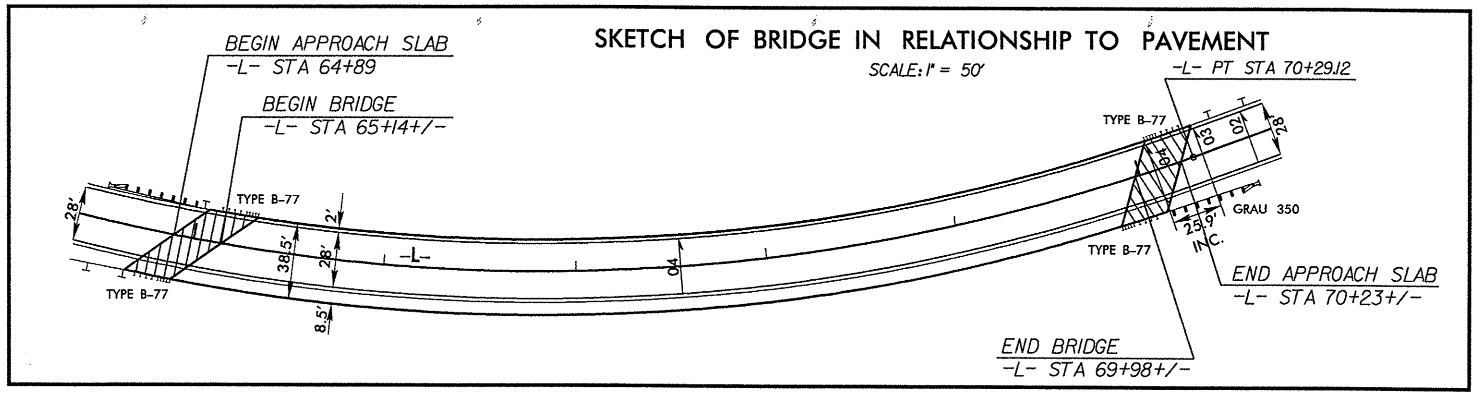
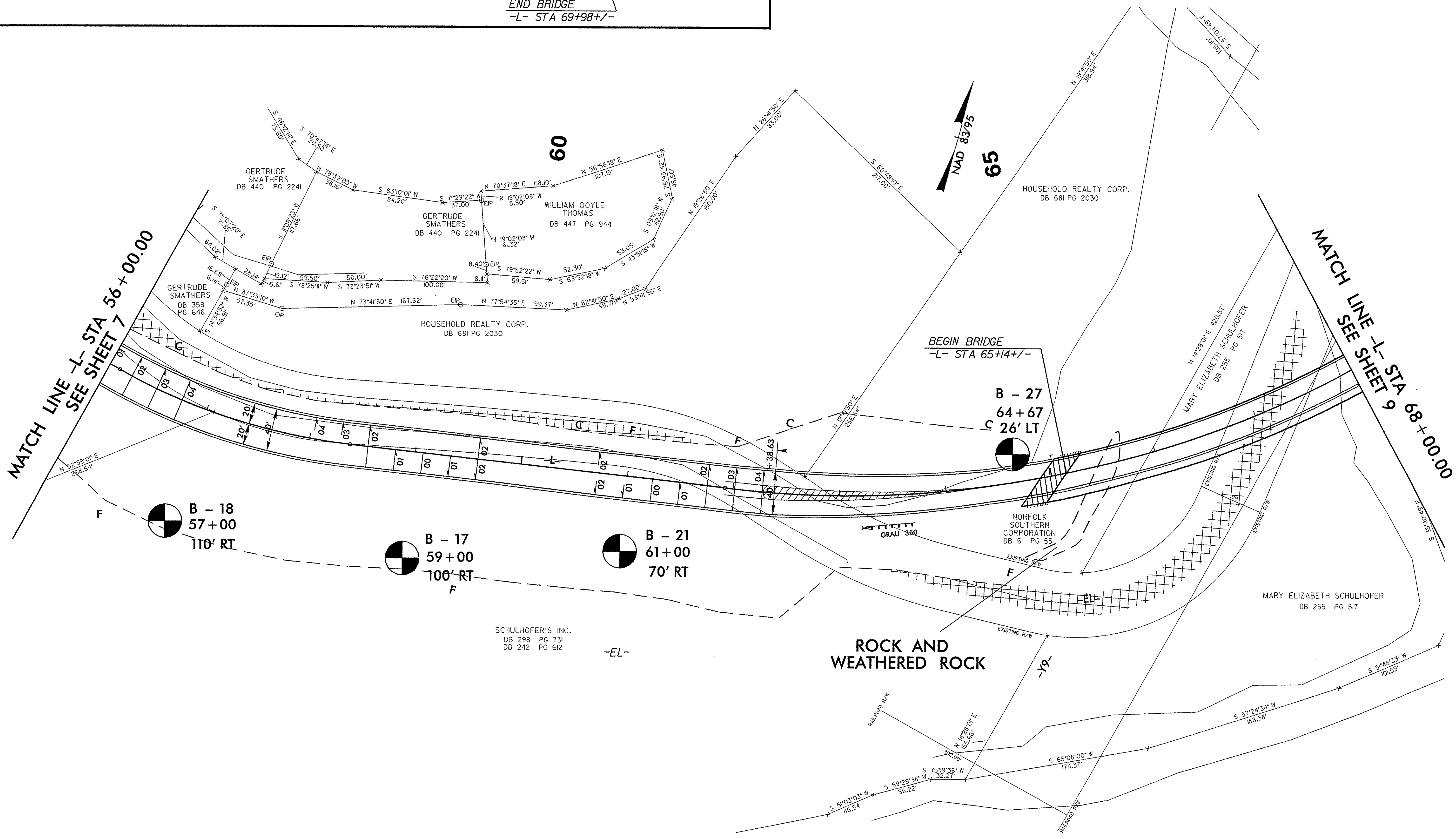
REVISIONS

SKETCH OF BRIDGE IN RELATIONSHIP TO PAVEMENT

SCALE: 1" = 50'





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PROJECT REFERENCE NO.	SHEET NO.
U-4412	9 OF 82
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/9

MATCH LINE -L- STA 68+00.00
SEE SHEET 8

MATCH LINE -L- STA 80+00.00
SEE SHEET 10

REMOVE EXISTING STRUCTURE

BLUE RIDGE PAPER PRODUCTS, INC.
DB 472 PG 1065

NORFOLK SOUTHERN CORPORATION
DB 6 PG 55

RAILROAD R/W

EXISTING R/W

WATER METER PIT

-EL- STA 80+74.43 =
-Y8A- STA 10+00.00

NORFOLK SOUTHERN CORPORATION
DB 6 PG 55

70

75

-Y9-

-EL-

PUMP STA

N 14°28'01" E 217.22'

S 54°54'37" E 82.37'

S 57°04'49" E 105.10'

S 54°57'16" E 93.88'

239.15'

239.68'

CLARENCE SPURGEON SHELTON
DB 634 PG 1435

50' R

EIP

N 06°27'30" E 22.42'

N 06°27'30" E 26.27'

N 06°27'30" E 235.70'

S 49°09'39.4" E

-Y8A-

NAD 83/95

BLUE RIDGE PAPER PRODUCTS, INC.
DB 472 PG 1065
DB 180 PG 163

B - 13
73+00
50' LT

B - 15
72+50
34' LT

B - 10
80+00
35' LT

B - 5
80+00
℄

B - 14
71+50
30' RT

B - 12
74+00
℄

B - 11
75+00
℄

B - 9
77+22
℄

B - 8
79+00
30' RT

S 82°54'22" W 230.27'

-L-

-Y8-

ROCK

ROCK

END BRIDGE
-L- STA 69+98+/-

CLARENCE SPURGEON SHELTON
DB 634 PG 1435

S 06°54'12" W 244.39'

S 06°58'34" W 2.46'

183.33'
S 06°58'34" W

N 17°40'08" W 181.70'

N 81°41'16" W 217.28'

S 39°11'07" E 170.32'

CLARENCE SPURGEON SHELTON
DB 634 PG 1433

CLARENCE SPURGEON SHELTON
DB 634 PG 1437

GLENN TOLAR
DB 659 PG 237

PRIVATE ROAD EASEMENT -- 40' WIDE

PRIVATE ROAD EASEMENT -- 40' WIDE

JEFFERY NORRIS
DB 654 PG 344

S 76°23'06" W 616.58'

$$$$$$$SYSTIME$$$$$$
$$$$$$$USERNAME$$$$$
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PROJECT REFERENCE NO.	SHEET NO.
U-4412	10 OF 89
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/9

85

NAD 83/95

END TIP PROJECT U-4412
-L- STA 85+59.83

-Y10-

B - 7
81+50
℄

B - 3
82+00
C 17' RT

DP TEST
84+00
47' RT

B - 5
80+00
℄

B - 6
81+00
40' RT

MATCH LINE -L- STA 80+00.00
SEE SHEET 9

N 82° 43' 02.2" E

150'-300'-150' R

60' R

F

C

-L-

\$\$\$\$SYSTIME\$\$\$\$
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\$\$\$\$REFDIMS\$\$\$\$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	11 80

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2675 2670 2665 2660 2655 2650 2645 2640 2635 2630 2625 2620 2615 2610 2605

SAPROLITE: LOOSE TO MED. DENSE SILTY FINE TO COARSE SAND, SOME MICA AND MnO

B-20
18+00
40' RT

ARTIFICIAL FILL, BRN/RED CLAYEY SILT

(2)

(8)

ALLUVIAL, TAN/BRN SILTY SAND

WOH

(12)

SAPROLITE, BRN/TAN SILTY SAND, SOME MICA

18+00.00

—L—

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$USERNAME$$$$

B-19
18+00
167-LT

24
21
17
11
16
13
9
19
21
18
100+

ARTIFICIAL FILL (ENGINEERED), RED/BRN SILTY SAND W/ GRAVEL

SAPROLITE, RED/BRN SILTY FINE TO COARSE SAND, SOME MICA AND MnO

WEATHERED ROCK, WEATHERED BIOTITE GNEISS

18+00.00

$$$$$$SYSTIME$$$$$$
$$$$$$SHEETDGN$$$$$$
$$$$$$USERNAME$$$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	13182

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2680
2675
2670
2665
2660
2655
2650
2645
2640
2635
2630
2625

SAPROLITE: LOOSE TO MED. DENSE SILTY FINE TO COARSE SAND, SOME MICA AND MnO

18+50.00

ARTIFICIAL FILL: LOOSE SANDY SILT OVER ALLUVIUM

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$FRAME$$$$
$$$$USER$$$$

8/23/

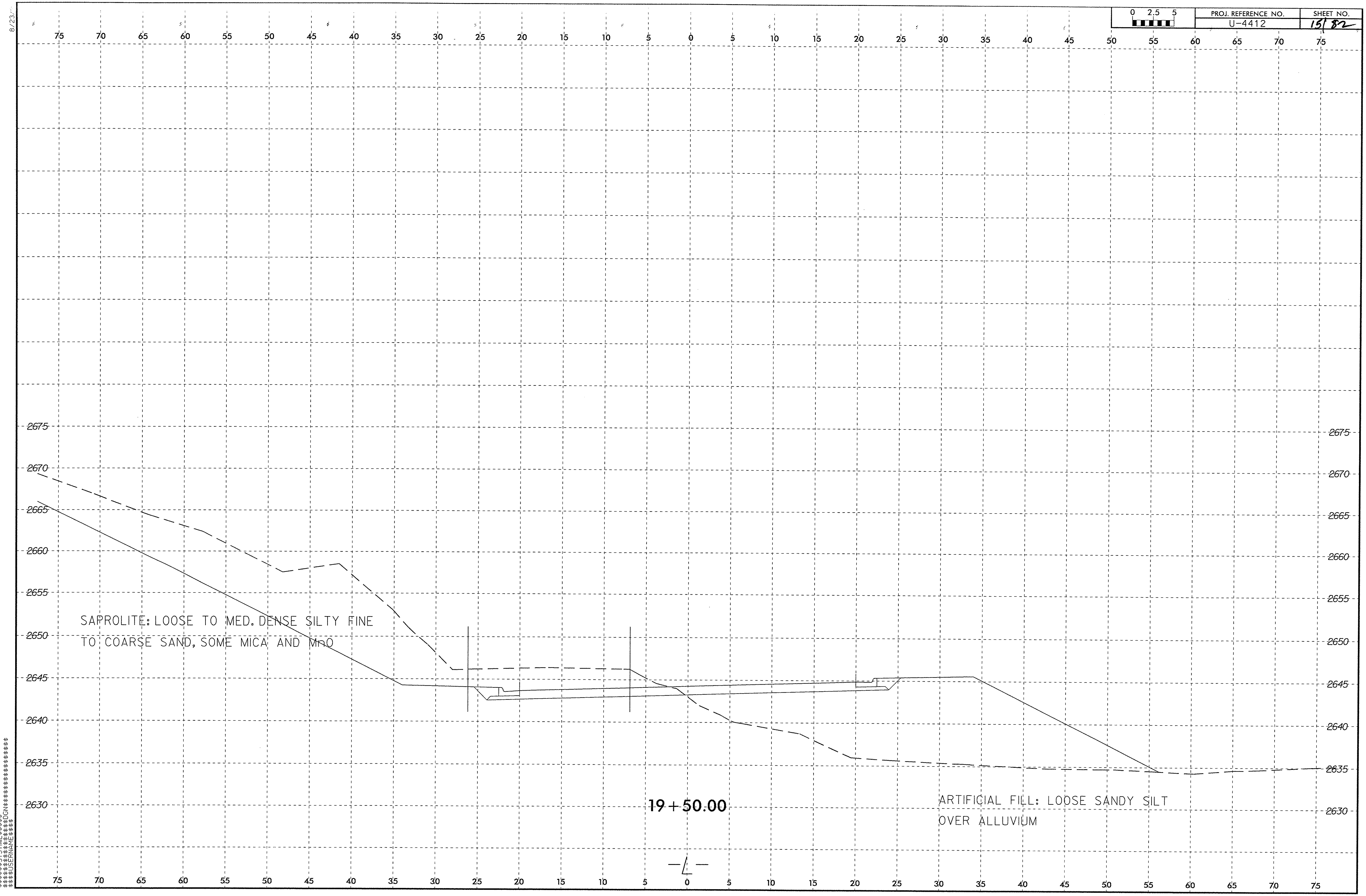
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	14 of 82

SAPROLITE: LOOSE TO MED. DENSE SILTY FINE TO COARSE SAND, SOME MICA AND MnO

ARTIFICIAL FILL: LOOSE SANDY SILT OVER ALLUVIUM

19+00.00

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$FILENAME$$$$



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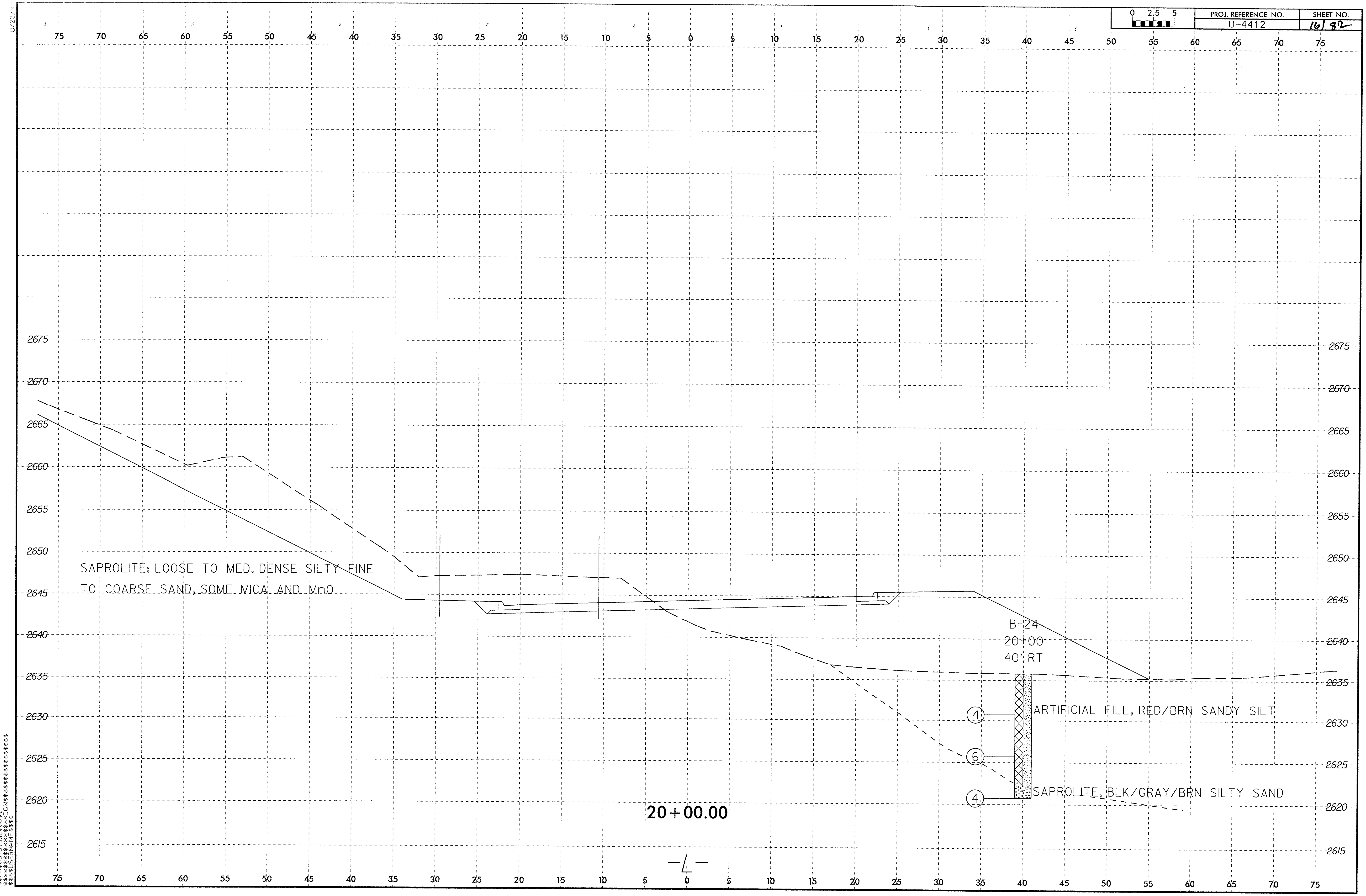
$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	16/82



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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2670
2665
2660
2655
2650
2645
2640
2635
2630

SAPROLITE: LOOSE TO MED. DENSE SILTY FINE TO COARSE SAND, SOME MICA AND MnO

20+50.00

ARTIFICIAL FILL: LOOSE SANDY SILT OVER ALLUVIUM

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$DGN$$$$$$$$$$$$$$$$$$$$

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2665 2660 2655 2650 2645 2640 2635 2630

21+50.00

ARTIFICIAL FILL: LOOSE TO MED. DENSE SANDY AND CLAYEY SILT

2665 2660 2655 2650 2645 2640 2635 2630

21+00.00

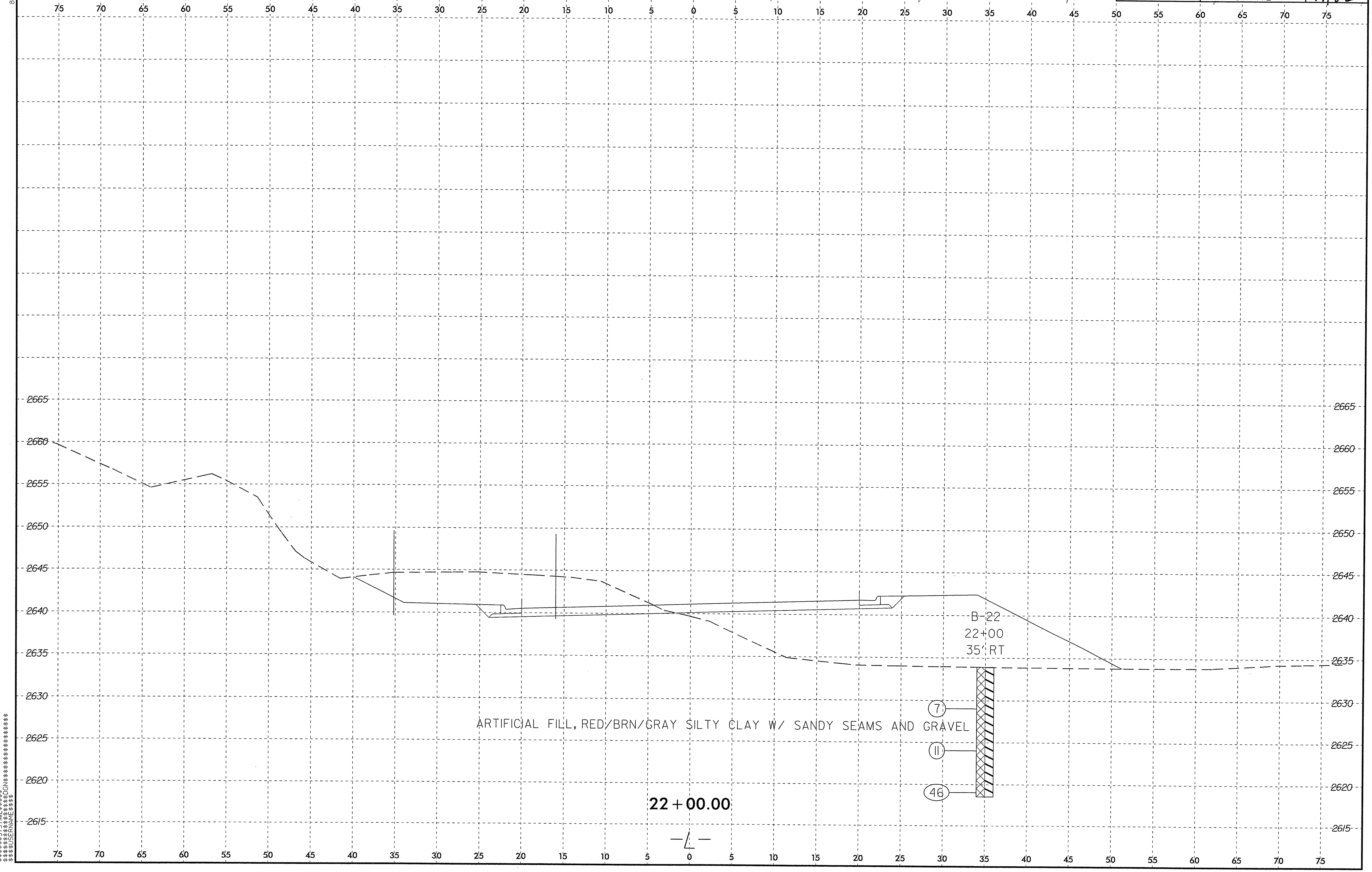
—℄—

ARTIFICIAL FILL: LOOSE TO MED. DENSE SANDY AND CLAYEY SILT

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$DIVISION$$$$
$$$$PROJECT$$$$
$$$$FILENAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	19/82



8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	20182

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2645
2640
2635
2630
2625
2620

24+00.00

ARTIFICIAL FILL: LOOSE YEL/BRN CLAYEY SILT

2650
2645
2640
2635
2630
2625
2620

23+75.00

—L—

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$PREVSAVE$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$

8/23/

0 2,5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	21 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2645
2640
2635
2630
2625
2620

ARTIFICIAL FILL: LOOSE YEL/BRN CLAYEY SILT

24+50.00

2645
2640
2635
2630
2625
2620

ARTIFICIAL FILL: LOOSE YEL/BRN CLAYEY SILT

24+25.00

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DATE$$$$
$$$$TIME$$$$
$$$$DESIGNATION$$$$
$$$$DESCRIPTION$$$$
$$$$FILENAME$$$$

8/23/10

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	2282

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2645
2640
2635
2630
2625
2620
2615

B-25
25+00
36' RT

4 ARTIFICIAL FILL, YEL/BRN CLAYEY SILT

9 ALLUVIAL, GRAY, SOME MICA, CLAYEY/SILTY SAND

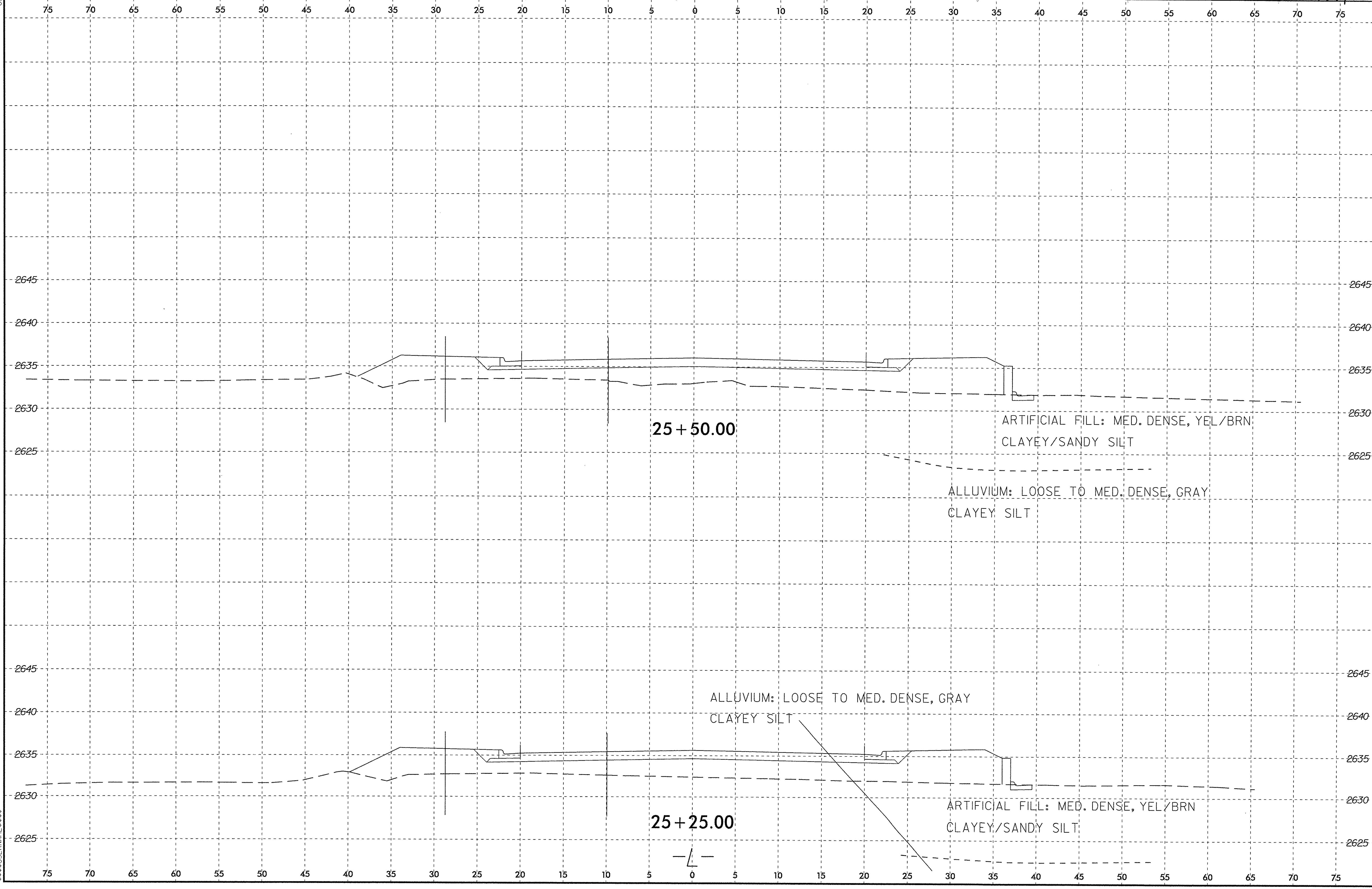
25+00.00

24+75.00

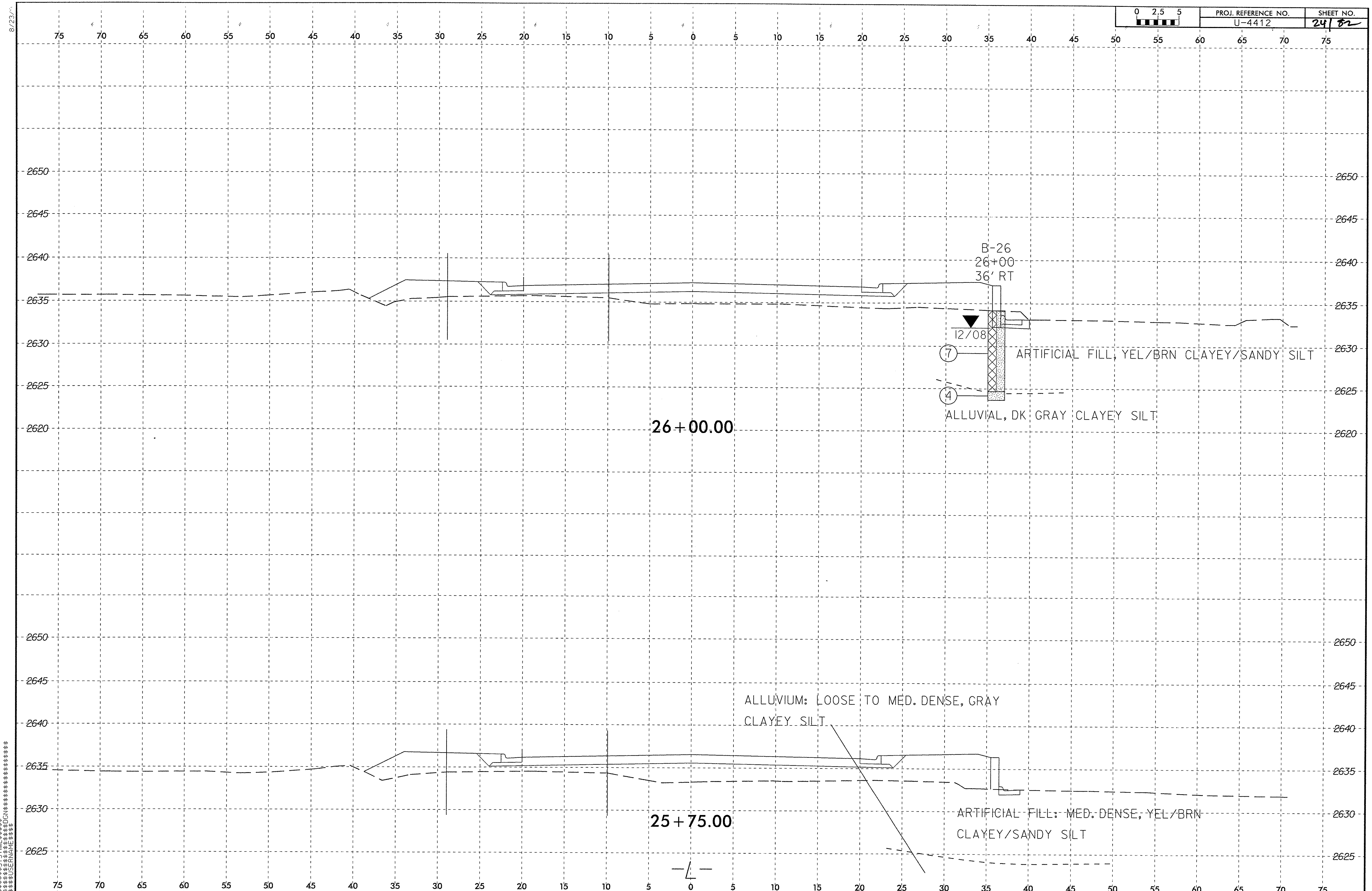
ARTIFICIAL FILL: LOOSE YEL/BRN CLAYEY SILT

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	23/82



PROJ. REFERENCE NO.	SHEET NO.
U-4412	24/82



8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	25/82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2650
2645
2640
2635
2630
2625
2620

27+00.00

B-23
26+40
36' RT

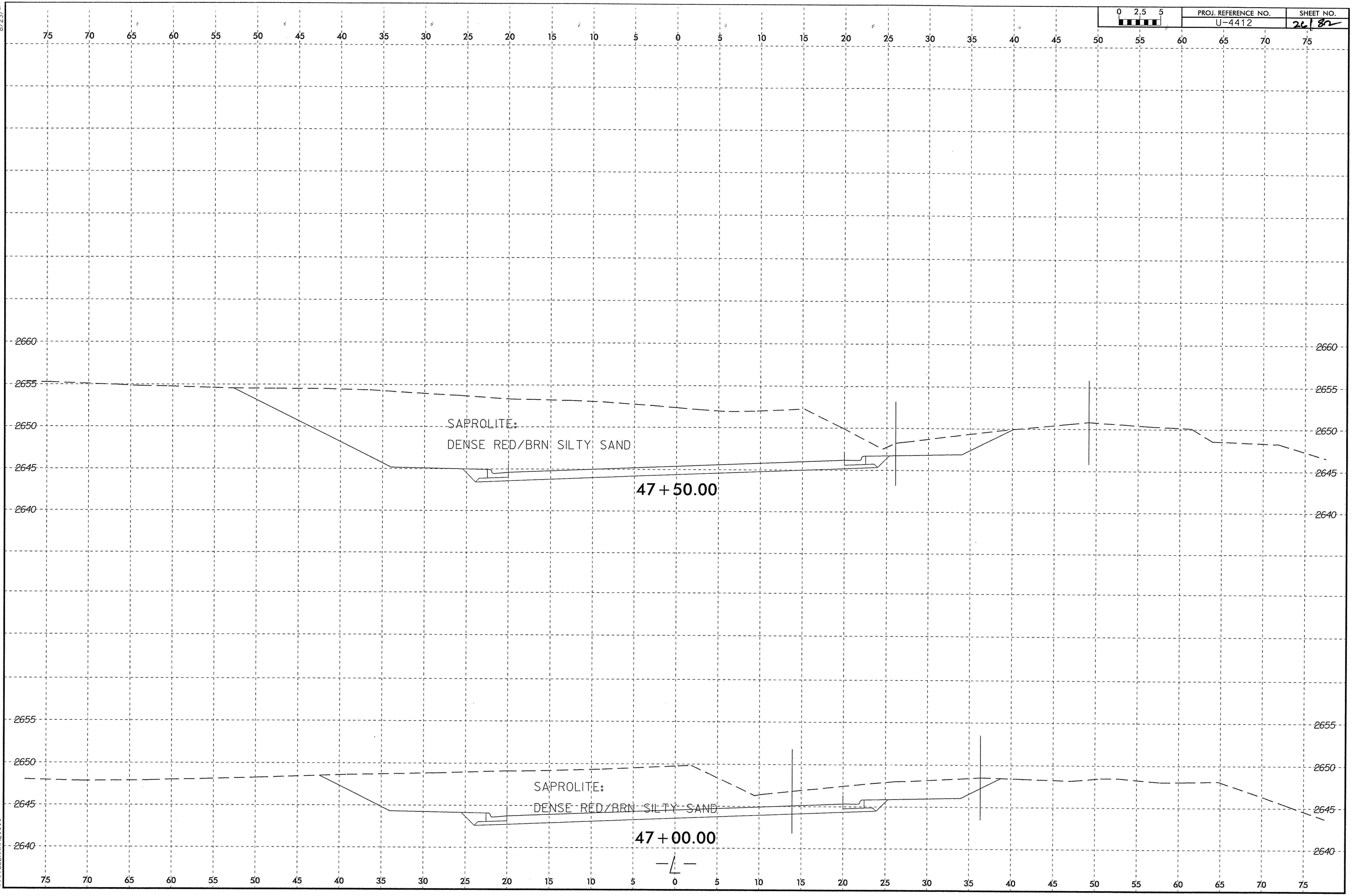
12/08

ARTIFICIAL FILL (ENGINEERED), RED/BRN/YEL SANDY SILT

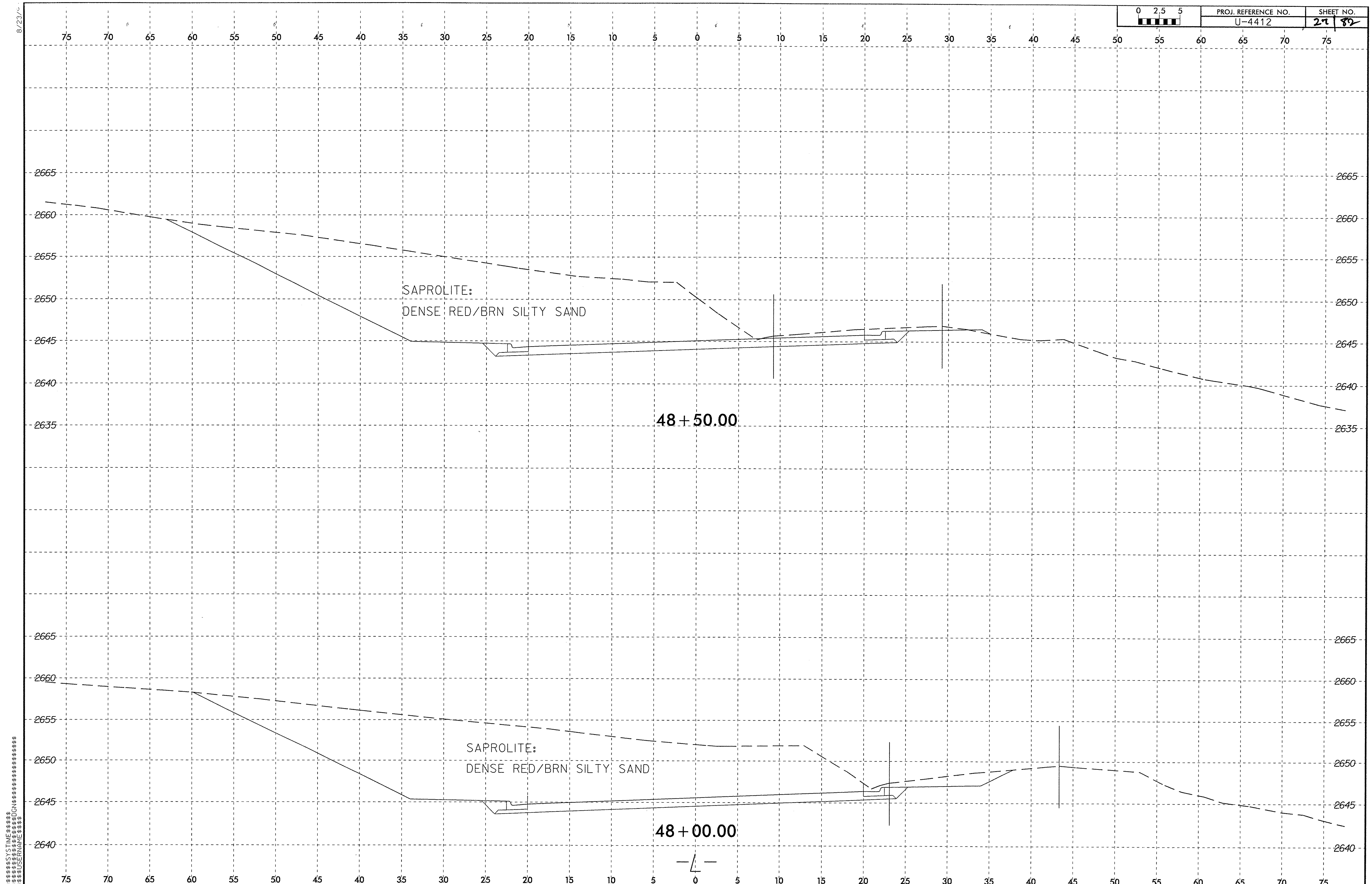
ALLUVIAL, LT. GRAY CLAYEY SAND

26+50.00

$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$


0 2.5 5
PROJ. REFERENCE NO.
U-4412
SHEET NO.
27 | 82
SAPROLITE:
DENSE RED/BRN SILTY SAND
48+50.00
SAPROLITE:
DENSE RED/BRN SILTY SAND
48+00.00
2665
2660
2655
2650
2645
2640
2635
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	28 / 32

SAPROLITE:
DENSE RED/BRN SILTY SAND

RDWY. EMBANKMENT:
LOOSE TO MED. DENSE SANDY SILT

SAPROLITE:
DENSE RED/BRN SILTY SAND

49+00.00

$$$$$$$$SYSTIME$$$$$
$$$$$$$$FILENAME$$$$$
$$$$$$$$USERNAME$$$$$

8/23/94

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	29 ~~52~~

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2665
2660
2655
2650
2645
2640
2635
2630
2625
2620
2615

SAPROLITE:
DENSE RED/BRN SILTY SAND

RDWY EMBANKMENT:
LOOSE TO MED. DENSE SANDY SILT

SAPROLITE:
DENSE RED/BRN SILTY SAND

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

49+50.00

—L—

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$
$$$$$$LEVEL$$$$$$
$$$$$$CELLNAME$$$$$$

8/23/

0 2,5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	30 of 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2660
2655
2650
2645
2640
2635
2630
2625
2620
2615

SAPROLITE:
DENSE RED/BRN SILTY SAND

RDWY EMBANKMENT:
LOOSE TO MED. DENSE SANDY SILT

SAPROLITE:
DENSE RED/BRN SILTY SAND

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

50+00.00

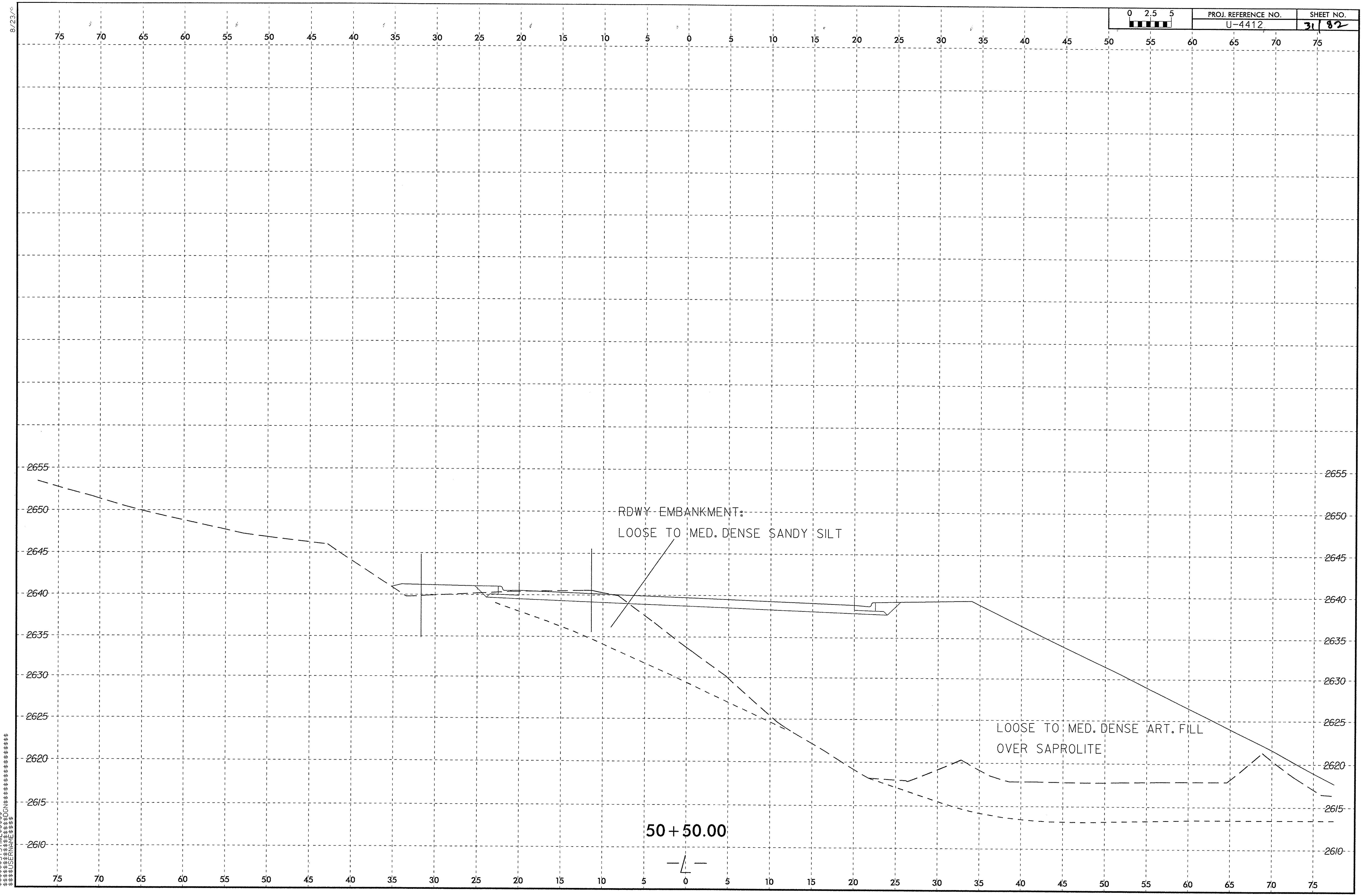
—L—

$$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

PROJ. REFERENCE NO. U-4412

SHEET NO. 31 / 82



RDWY. EMBANKMENT:
LOOSE TO MED. DENSE SANDY SILT

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

51+00.00

$$$$SYSTIME$$$$
$$$$PROJECT$$$$
$$$$DATE$$$$
$$$$DESIGN$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	33 82

RDWY EMBANKMENT:
LOOSE TO MED. DENSE SANDY SILT

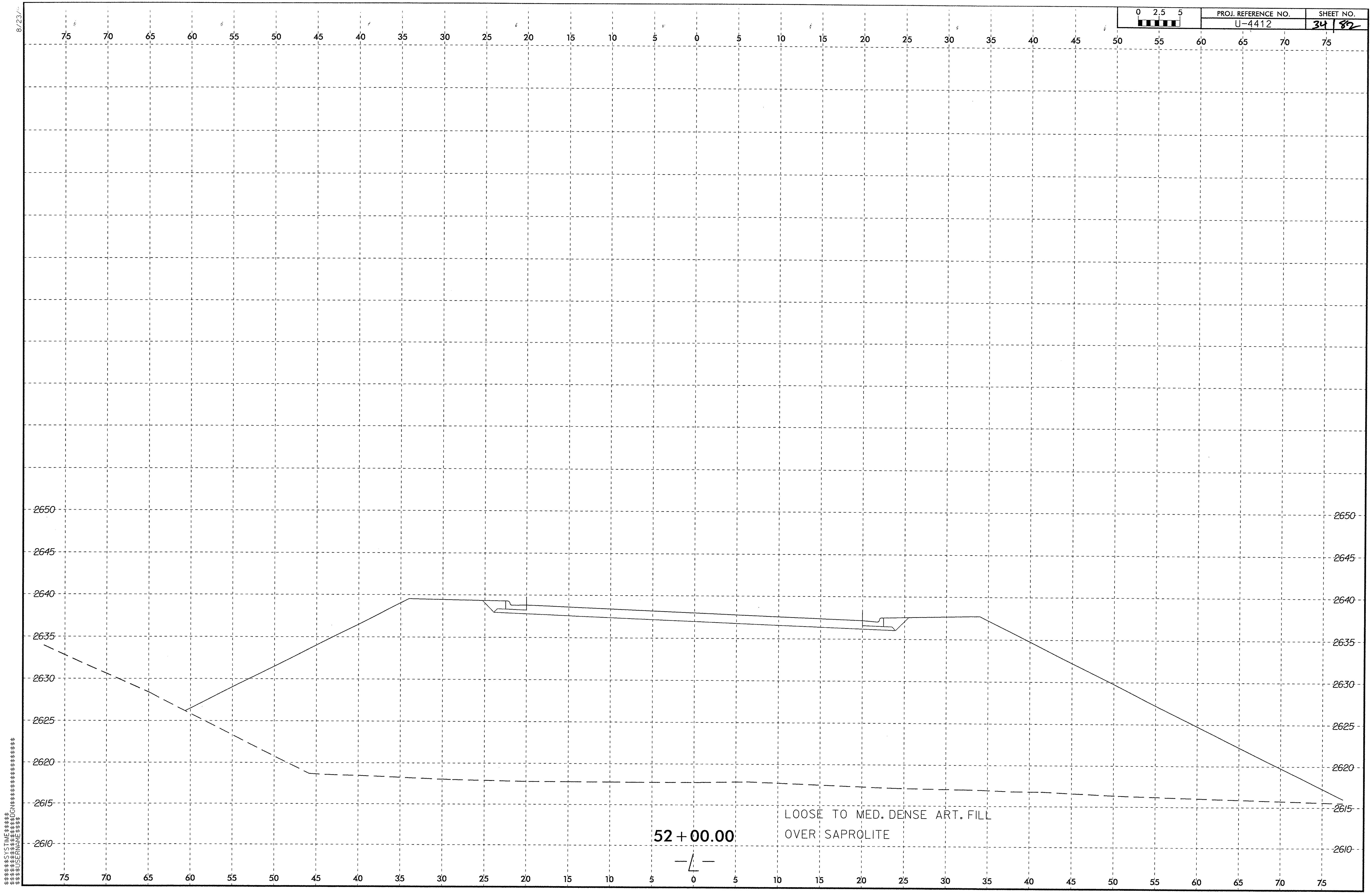
LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

51+50.00

—L—

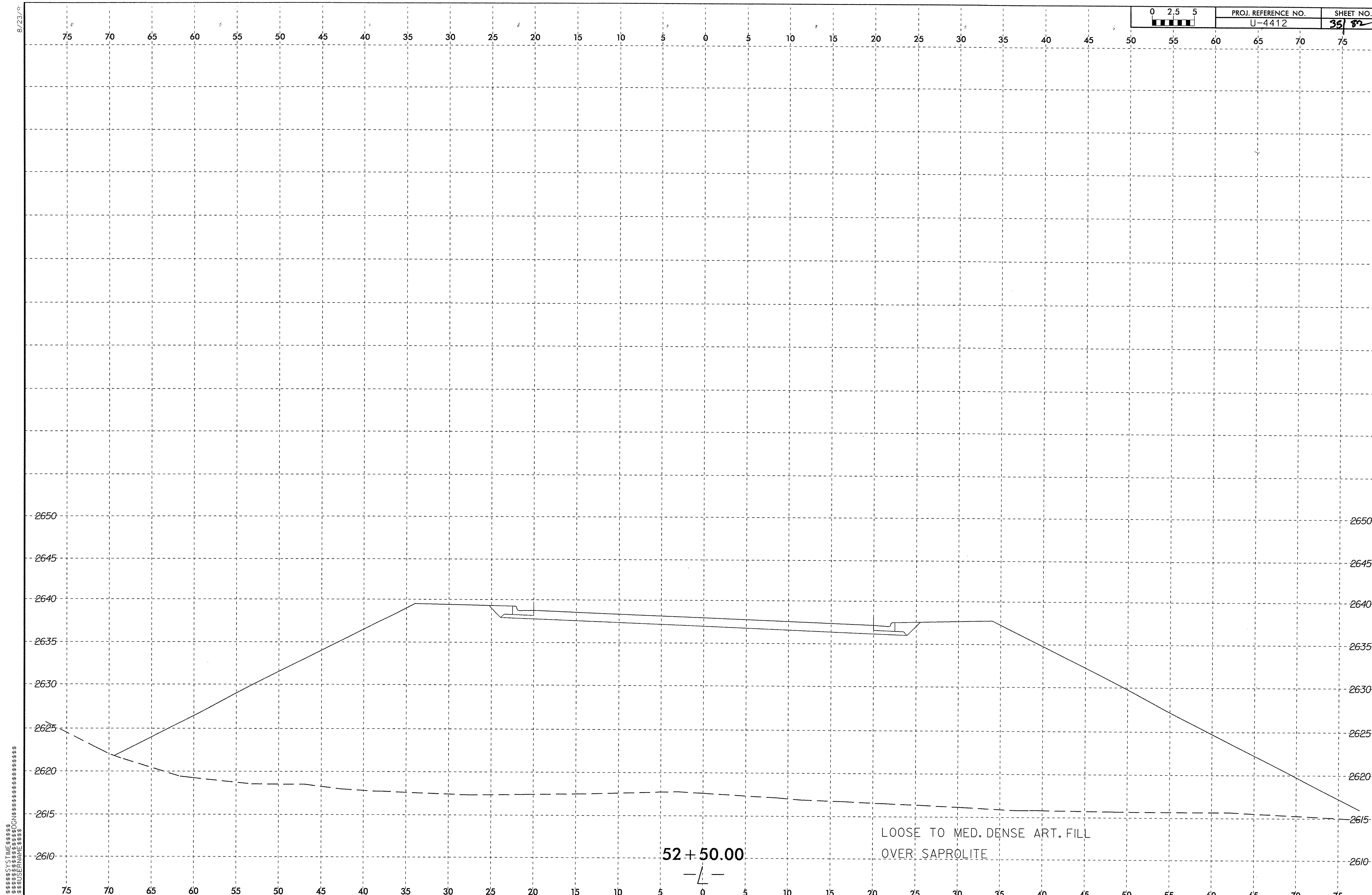
$$$$$$SYSTIME$$$$$
$$$$$USERNAME$$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	34 / 82



PROJ. REFERENCE NO. U-4412

SHEET NO. 35/82



8/23/

0 2,5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	36 ~~52~~

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2650
2645
2640
2635
2630
2625
2620
2615
2610

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

53+00.00

—/—

$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5

PROJ. REFERENCE NO.	SHEET NO.
U-4412	39 of 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2650
2645
2640
2635
2630
2625
2620
2615
2610

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

53+50.00

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

$$$$SYSTIME$$$$
$$$$DUZN$$$$
$$$$PENAME$$$$
$$$$RENAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	38 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2650
2645
2640
2635
2630
2625
2620
2615
2610

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

54+00.00

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

$$$$SYSTIME$$$$
$$$$DESIGN$$$$
$$$$DRAWN$$$$
$$$$CHECK$$$$
$$$$USER$$$$

8/23/

0 2,5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	39 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2650 2645 2640 2635 2630 2625 2620 2615 2610

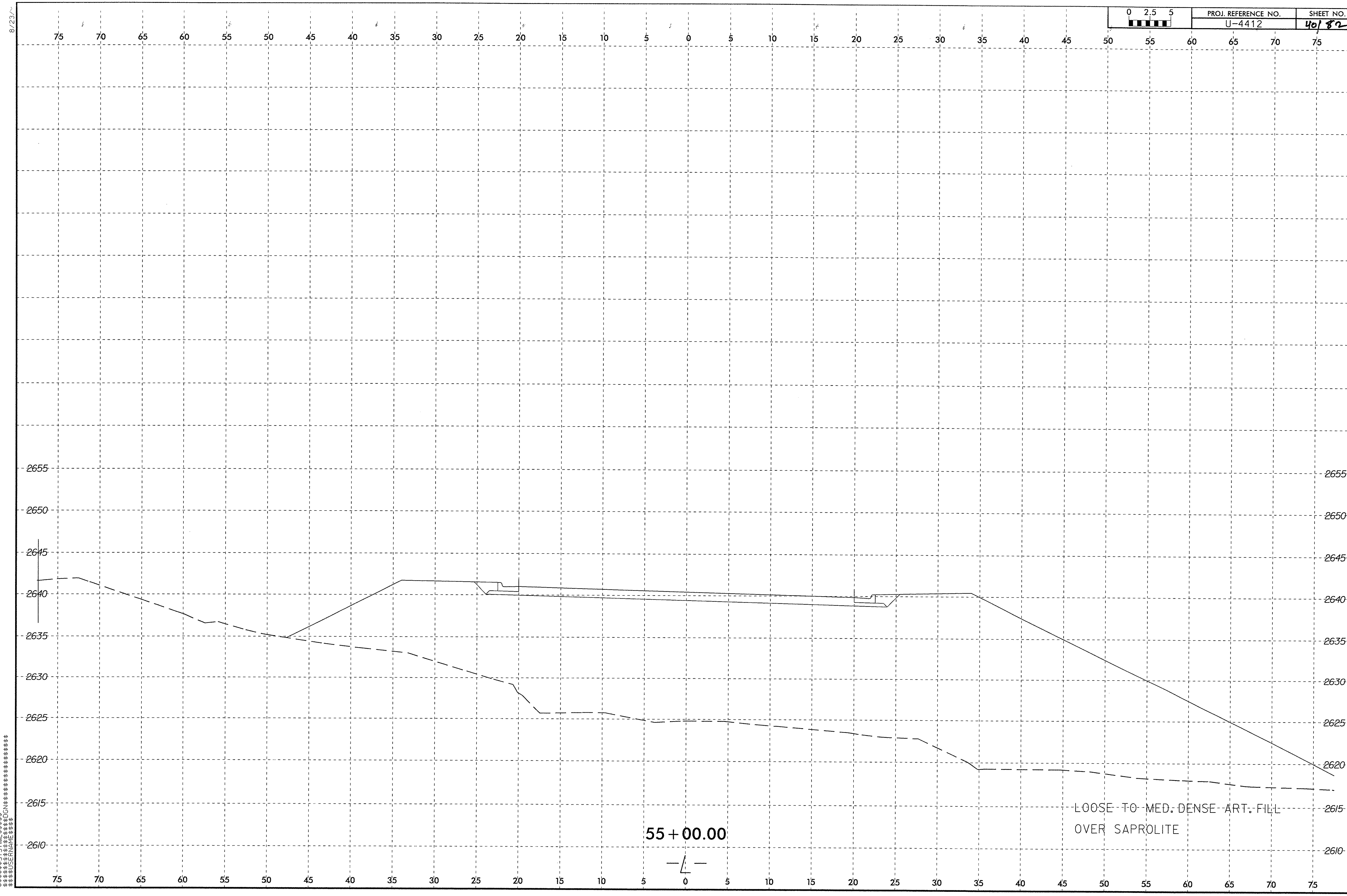
LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

54+50.00

—L—

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$
$$$$RFNAME$$$$
$$$$SHEETS$$$$
$$$$SCALE$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	40/82



8/23/

0 2,5 5

PROJ. REFERENCE NO.	SHEET NO.
U-4412	41 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

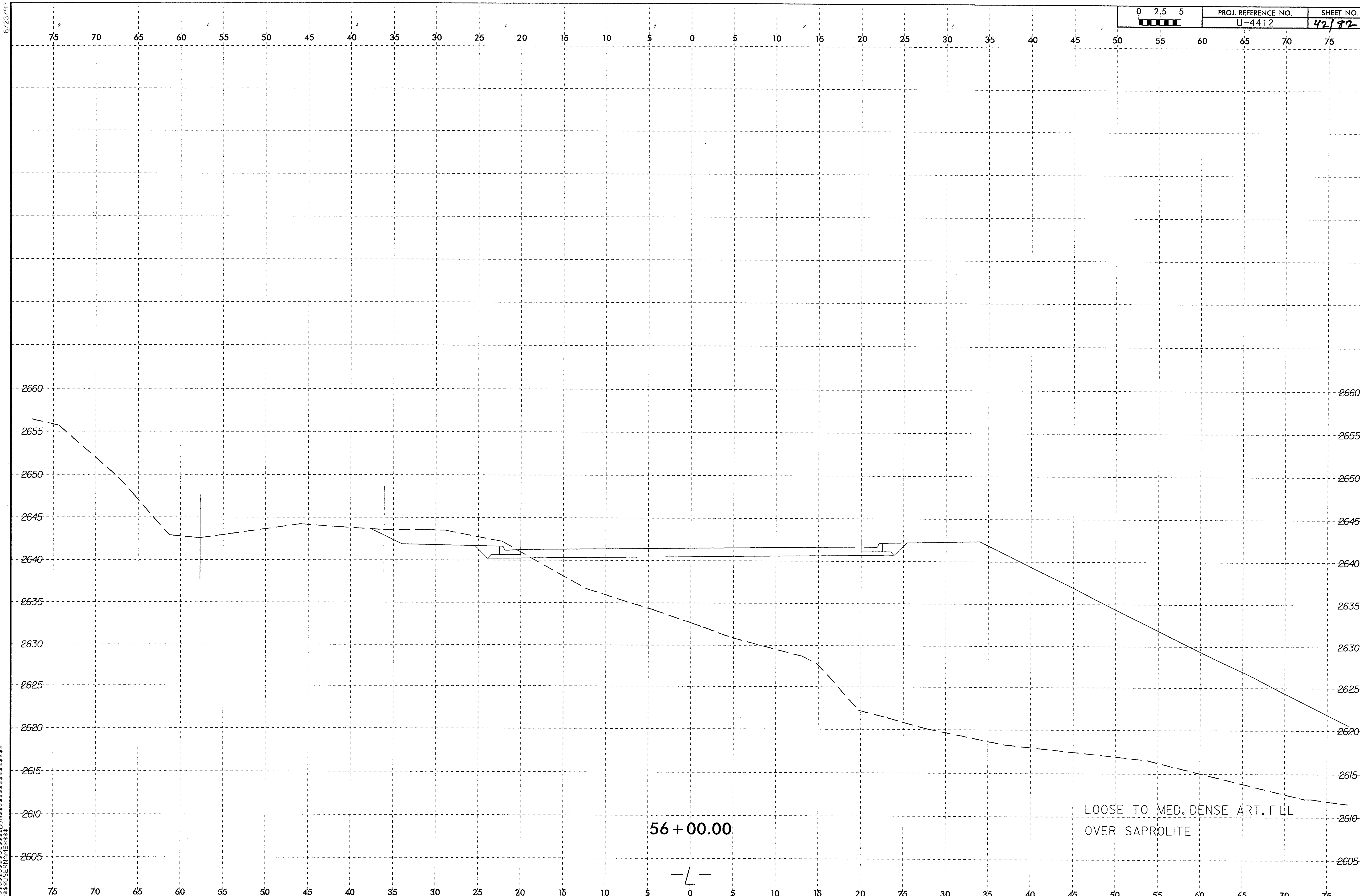
2650
2645
2640
2635
2630
2625
2620
2615
2610

55+50.00

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	42/82



8/23/99

$$$$$$SYSTIME$$$$$ $$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

8/23

0 2,5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	43/82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2660 2655 2650 2645 2640 2635 2630 2625 2620 2615 2610 2605 2600

LOOSE TO MED. DENSE ART. FILL
OVER SAPROLITE

56 + 50.00

—L—

$$$$$$SYSTIME$$$$$$
$$$$$$DIGNAME$$$$$$
$$$$$$USERNAME$$$$$$

8/23/13

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	44 / 82

2650
2645
2640
2635
2630
2625
2620
2615
2610
2605
2600
2595
2590
2585
2580
2575

B-18
57+00
110' RT

ARTIFICIAL FILL, BLK SILTY SAND AND GRAVEL W/ BOULDERS

2

ALLUVIAL, TAN/GRAY CLAYEY SILT W/ GRAVEL

66

14

31

SAPROLITE, BRN SILTY SAND, SOME MICA

27

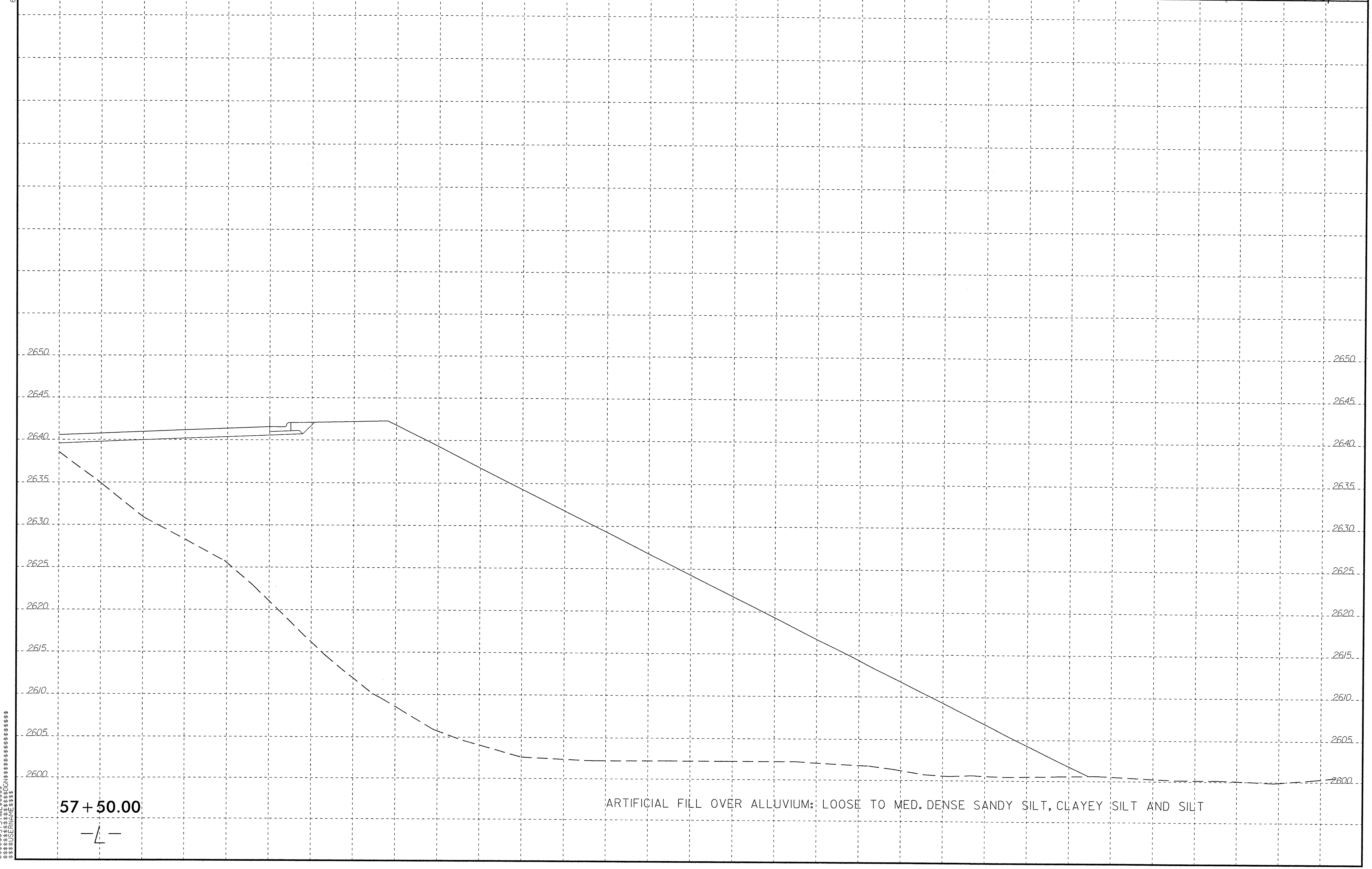
37

57+00.00

—L—

$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

Scale	PROJ. REFERENCE NO.	SHEET NO.
0 2.5 5	U-4412	45/82



$$$$$$SYSTIME$$$$$
$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	46 / 82

2645
2640
2635
2630
2625
2620
2615
2610
2605
2600

58+00.00

ARTIFICIAL FILL OVER ALLUVIUM: LOOSE TO MED. DENSE SANDY SILT, CLAYEY SILT AND SILT

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/-

0 2.5 5

PROJ. REFERENCE NO.	SHEET NO.
U-4412	42 82

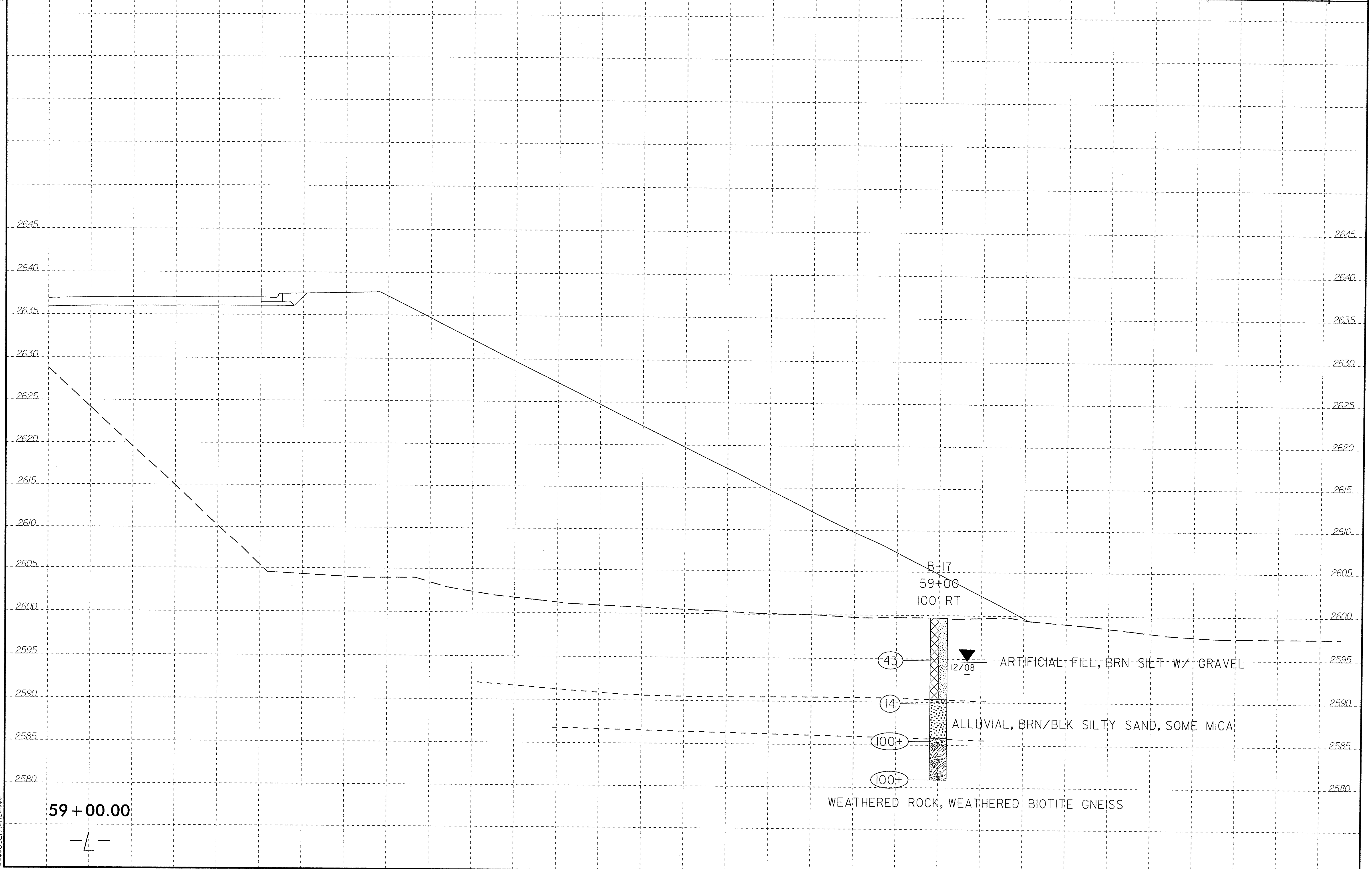
2645
2640
2635
2630
2625
2620
2615
2610
2605
2600

58+50.00
—L—

ARTIFICIAL FILL OVER ALLUVIUM: LOOSE TO MED. DENSE SANDY SILT, CLAYEY SILT AND SILT

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	48/82



$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	49/82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2655
2650
2645
2640
2635
2630
2625
2620
2615
2610
2605
2600
2595

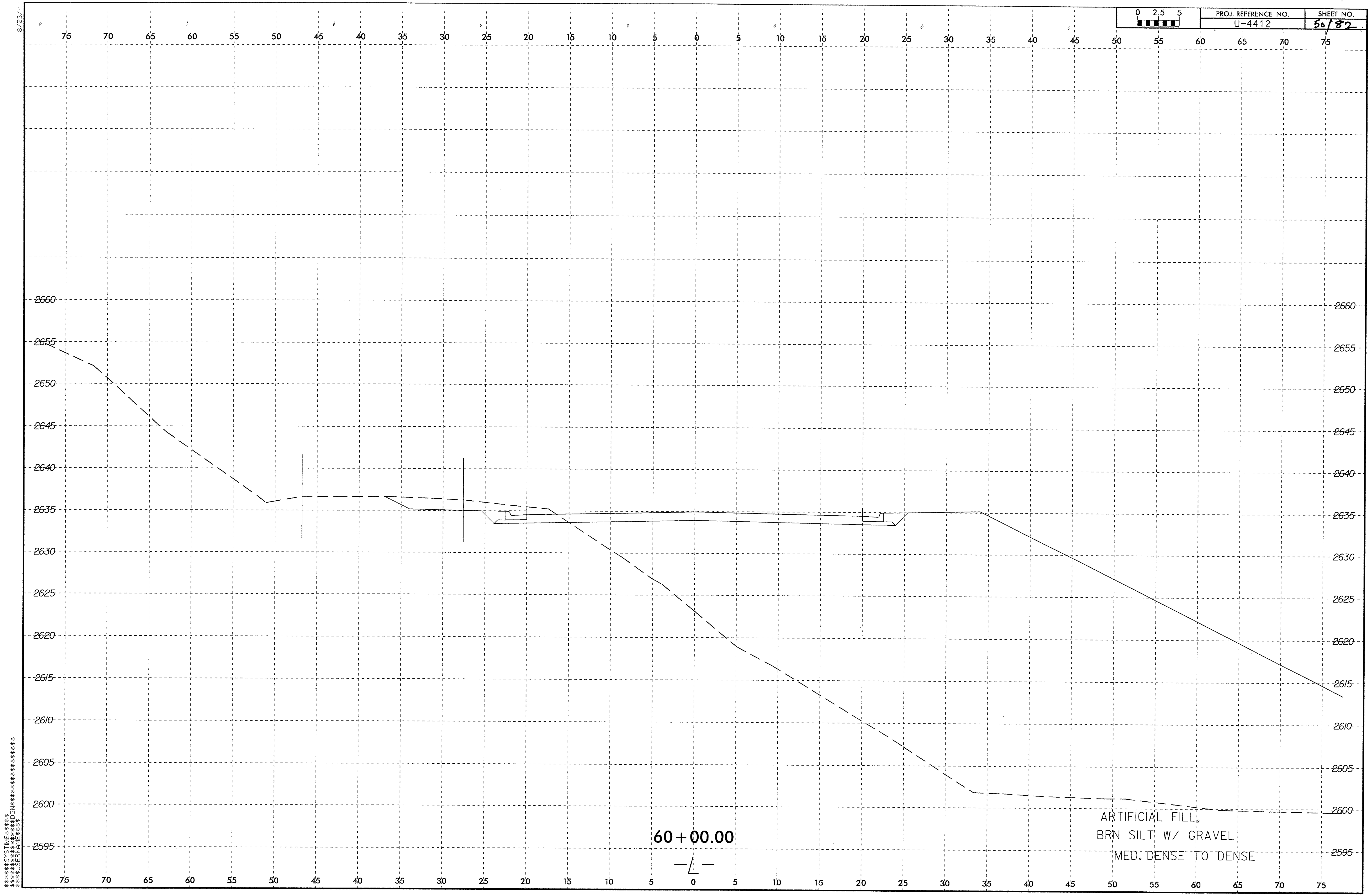
59+50.00

—L—

ARTIFICIAL FILL,
BRN SILT W/ GRAVEL
MED. DENSE TO DENSE

$$$$$$$$SYSTIME$$$$$
$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$$$DSETNAME$$$$

PROJ. REFERENCE NO. U-4412 | SHEET NO. 50/82



8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	51 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2655 2650 2645 2640 2635 2630 2625 2620 2615 2610 2605 2600 2595

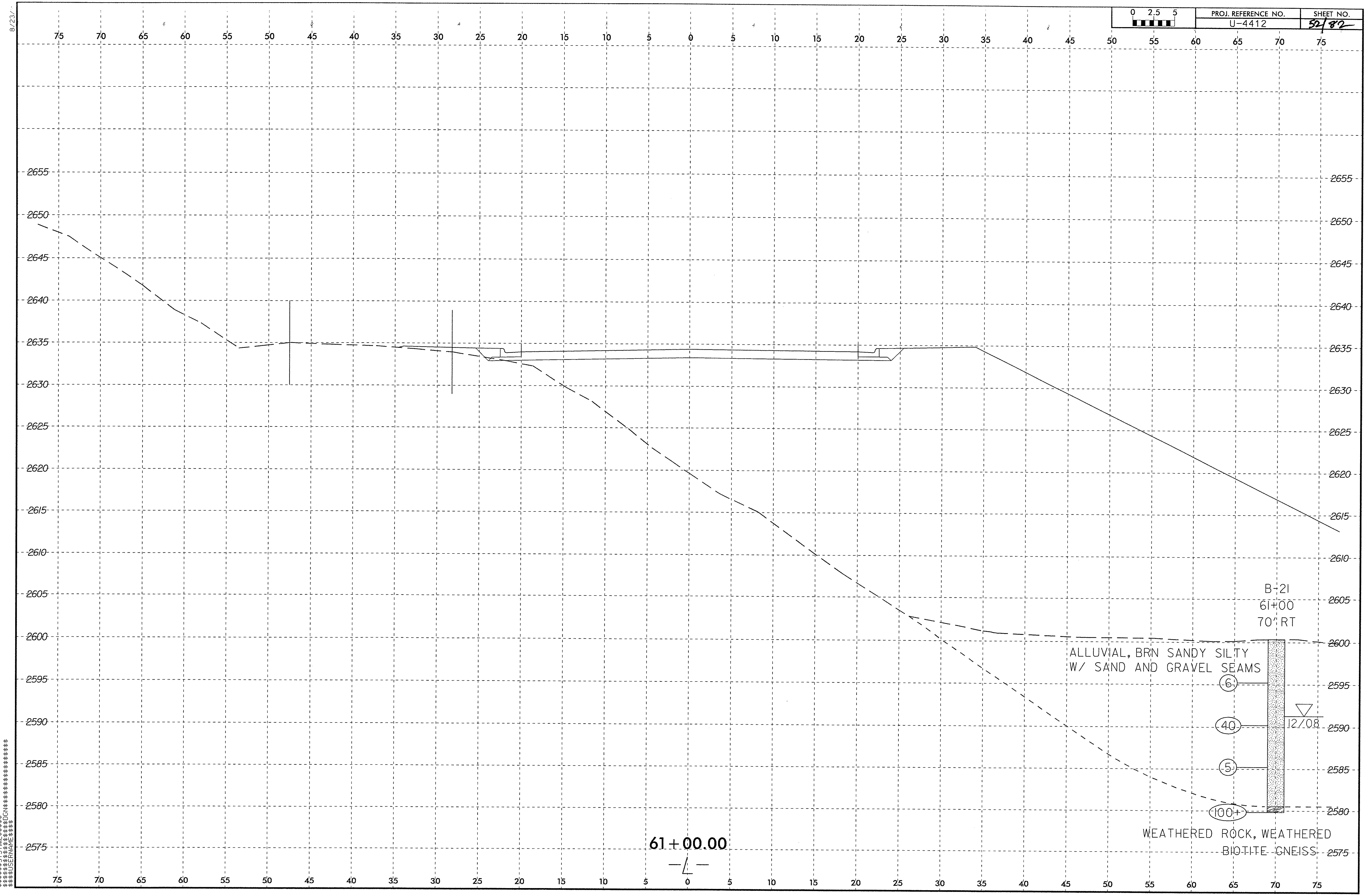
60+50.00

—L—

ALLUVIAL, BRN SANDY SILTY
W/ SAND AND GRAVEL SEAMS
MED. DENSE TO DENSE

$$$$SYSTIME$$$$
$$$$SYSDATE$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	52/82



8/23/10

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	52 182

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

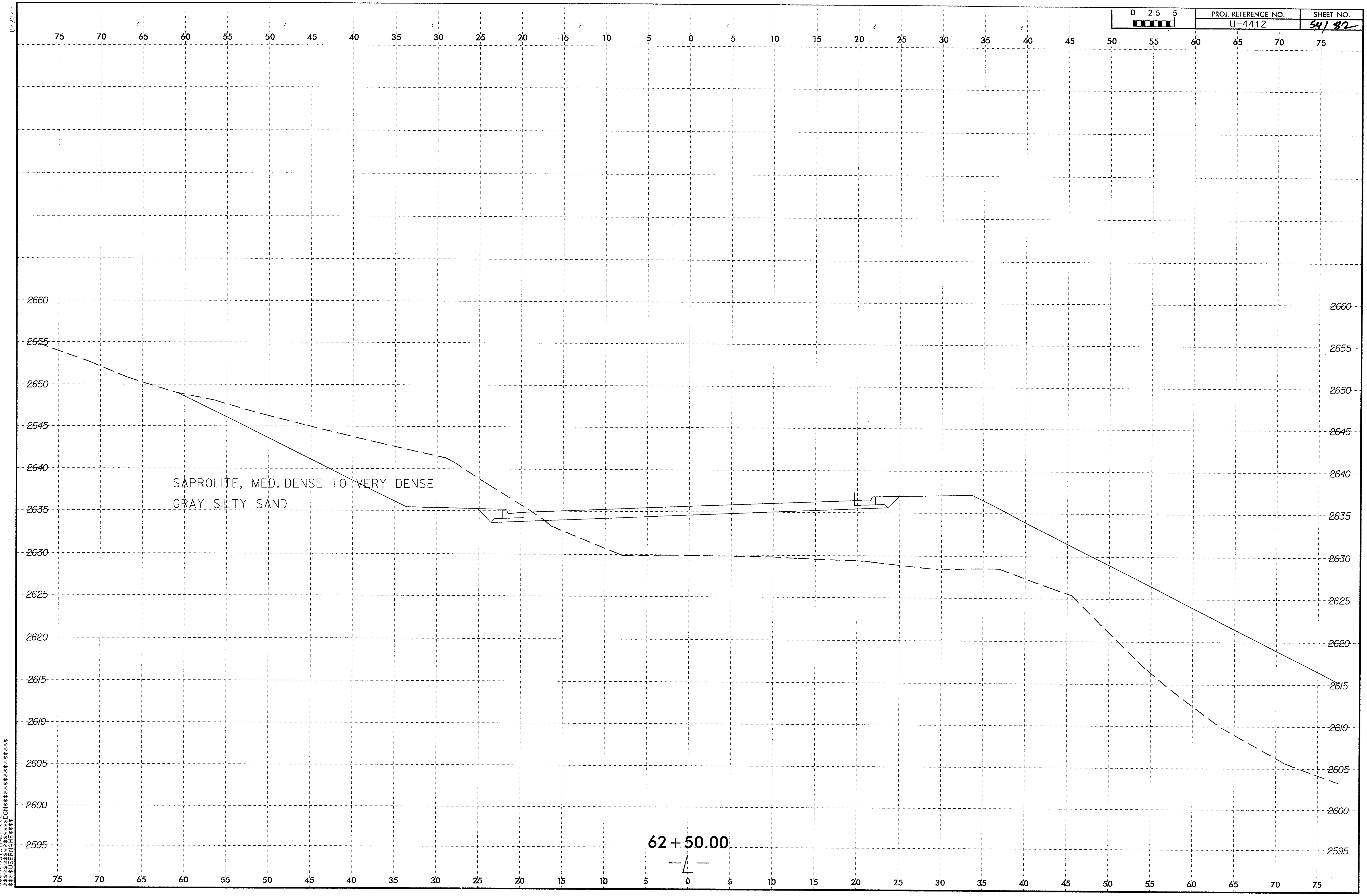
2650 2645 2640 2635 2630 2625 2620 2615 2610 2605 2600 2595

61+50.00

—L—

ALLUVIAL,
MED. DENSE TO DENSE BRN SANDY SILT

$$$$$SYSTIME$$$$
$$$$$USERNAME$$$$
$$$$$USERNAME$$$$



$$$$$$SYSTIME$$$$
$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

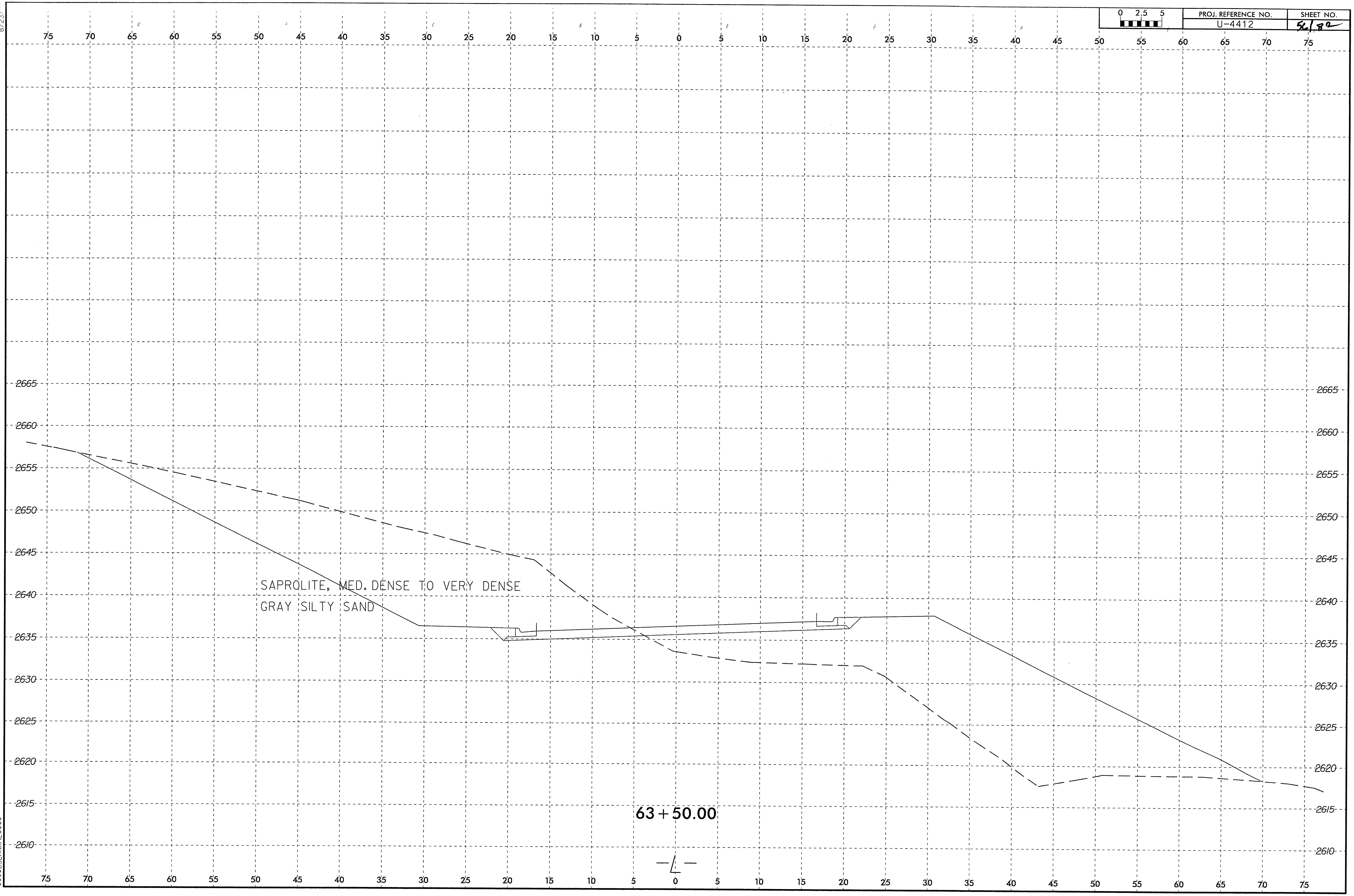
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	55/82

SAPROLITE, MED. DENSE TO VERY DENSE
GRAY SILTY SAND

63+00.00

$$\#\#\#\#\#SYSTIME\#\#\#\#\#$$
$$\#\#\#\#\#SYSTIME\#\#\#\#\#$$
$$\#\#\#\#\#USERNAME\#\#\#\#\#DGN\#$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	56/82



8/23/95

0 2.5 5

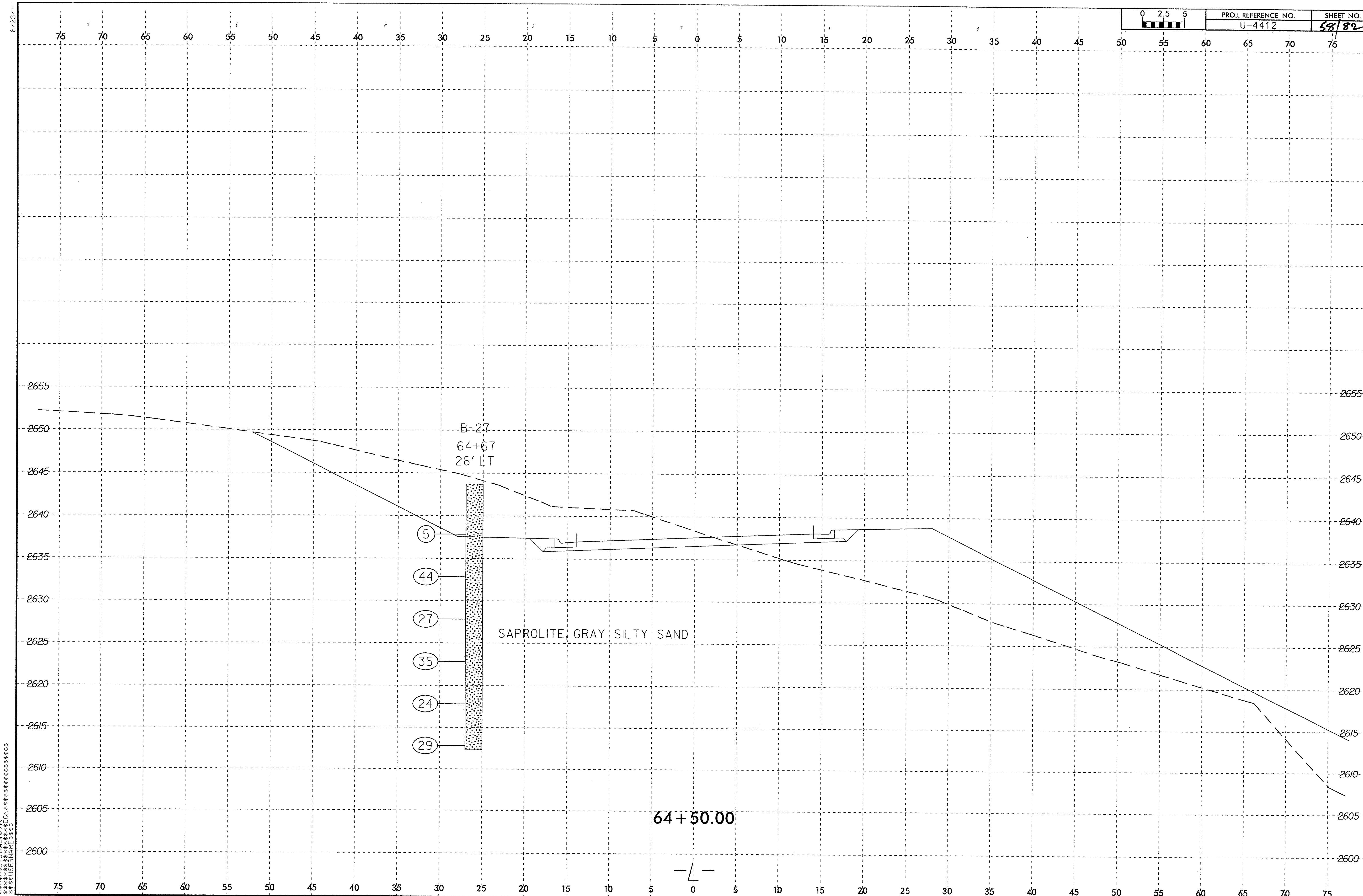
PROJ. REFERENCE NO.	SHEET NO.
U-4412	57/82

SAPROLITE, MED. DENSE TO VERY DENSE
GRAY SILTY SAND

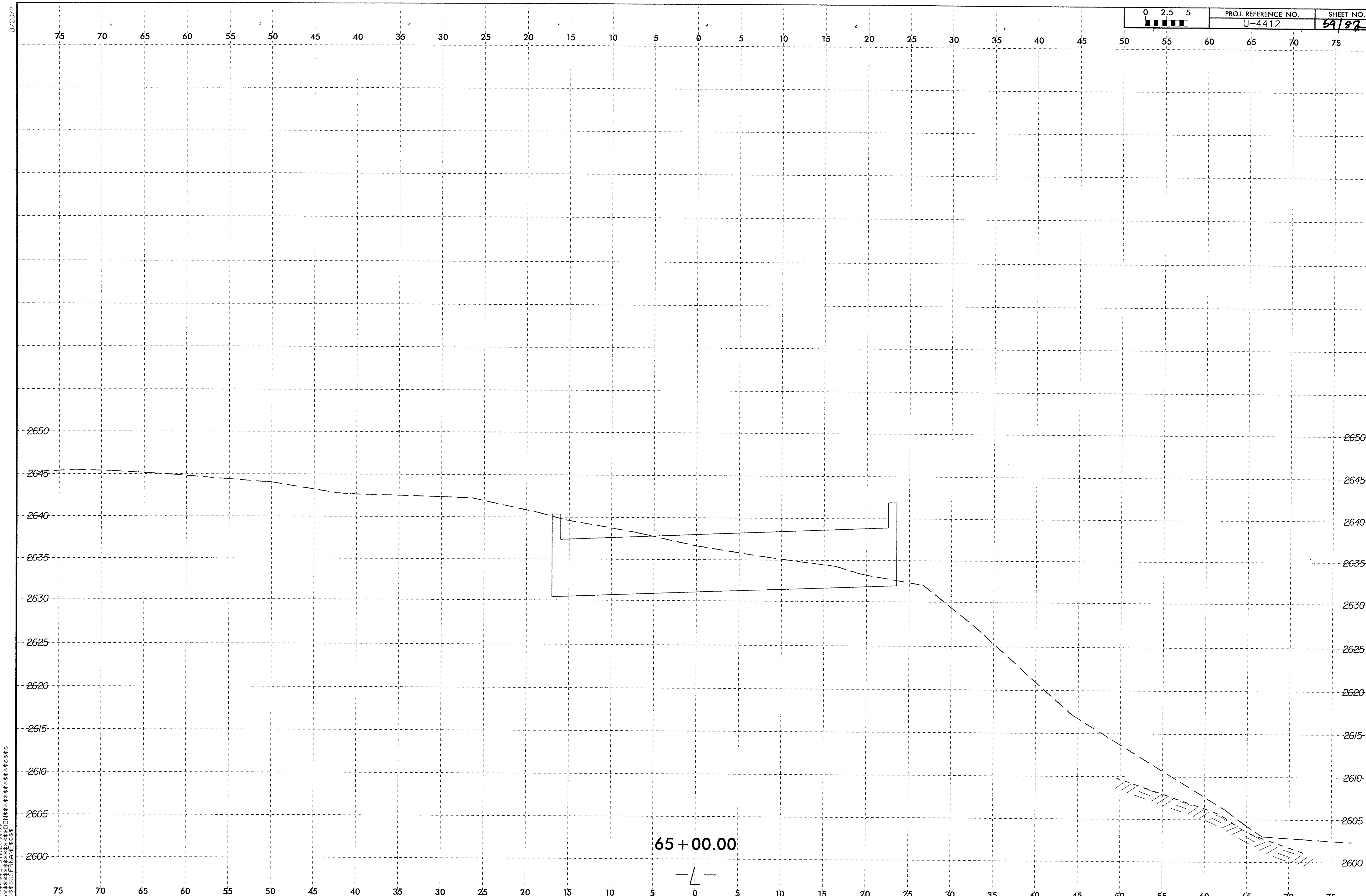
64+00.00

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	58/82



PROJ. REFERENCE NO.	SHEET NO.
U-4412	59/82



8/23/0

$$$$$SYSTIME$$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	60/82

69+00.00

$$$$$$SYSTIME$$$$
$$$$$$DGN$$$$$$$$$$
$$$$$$RFS$$$$$$$$$$
$$$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	61 82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

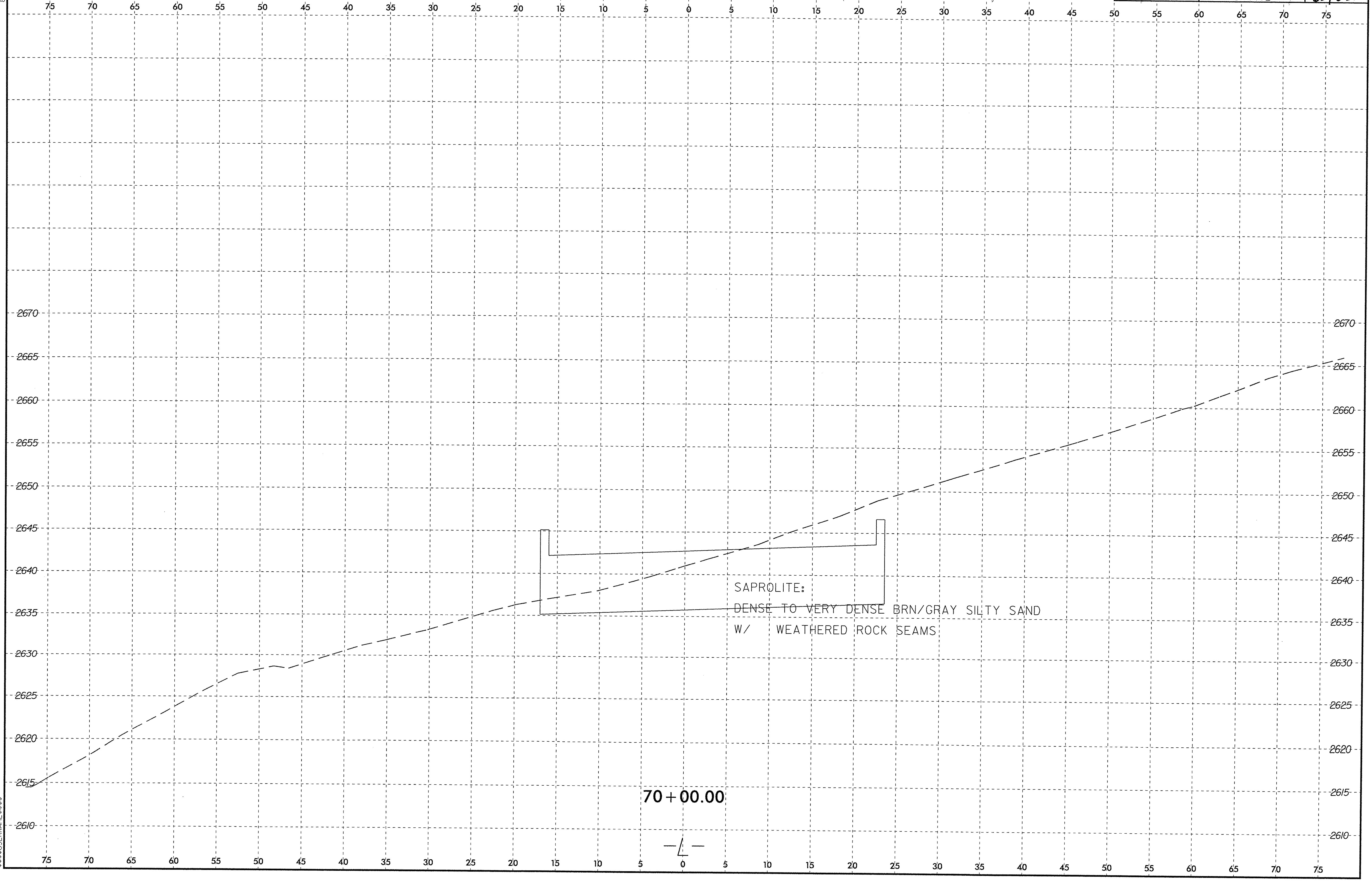
2660
2655
2650
2645
2640
2635
2630
2625
2620
2615
2610

SAPROLITE:
DENSE TO VERY DENSE BRN/GRAY SILTY SAND
W/ WEATHERED ROCK SEAMS

69+50.00

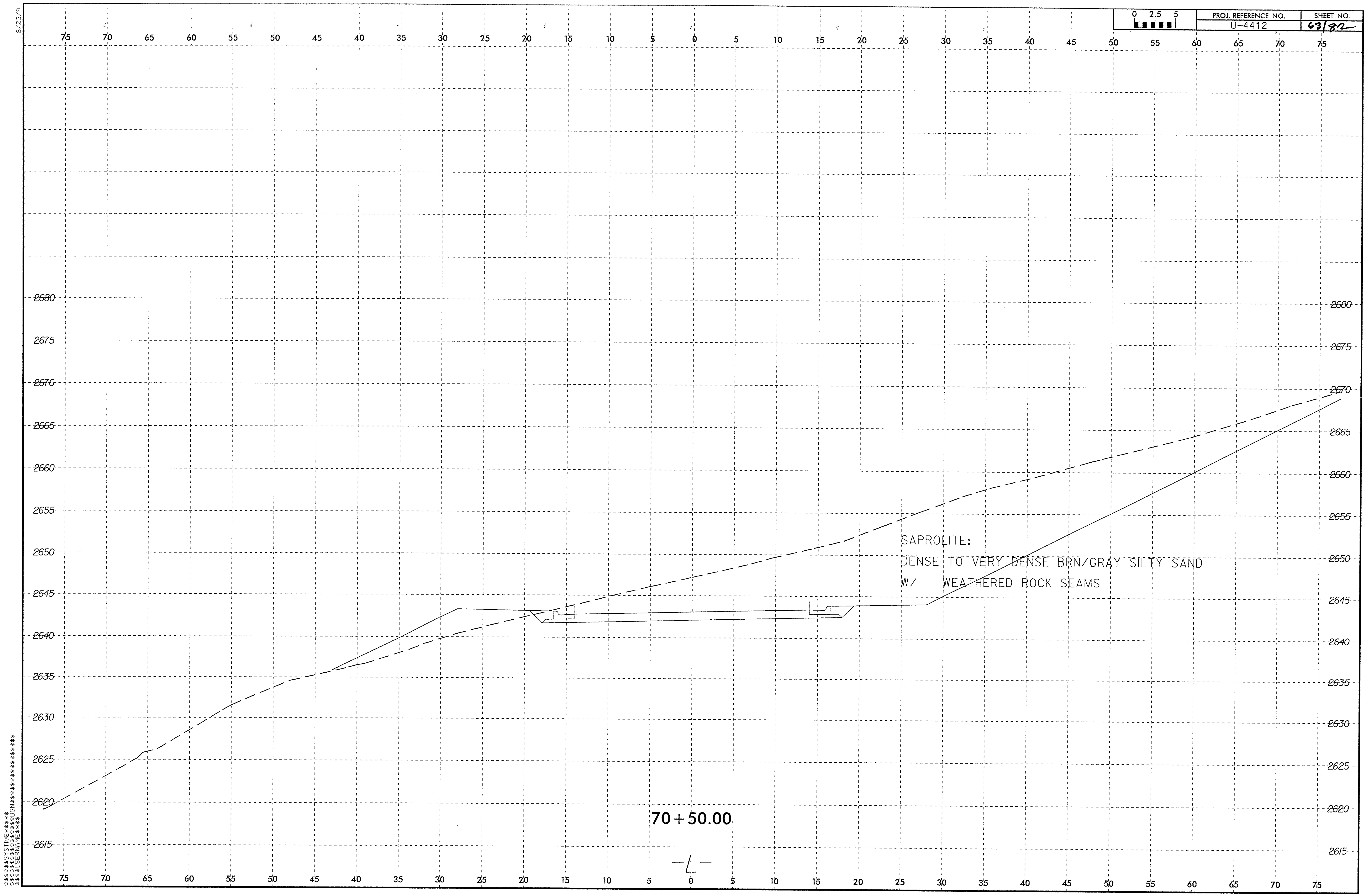
$$$$$$SYSTIME$$$$$$
$$$$$$USER$$$$$$
$$$$$$DATE$$$$$$
$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	62/82



8/23/9

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$$


PROJ. REFERENCE NO.
U-4412
SHEET NO.
63/82
0 2.5 5
SAPROLITE:
DENSE TO VERY DENSE BRN/GRAY SILTY SAND
W/ WEATHERED ROCK SEAMS
70+50.00
-L-
2680
2675
2670
2665
2660
2655
2650
2645
2640
2635
2630
2625
2620
2615
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
8/23/9
$$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	64/82

SAPROLITE:
DENSE TO VERY DENSE BRN/GRAY SILTY SAND
W/ WEATHERED ROCK SEAMS

71+00.00

$$$$$$SYSTIME$$$$$$
$$$$$$DATE$$$$$$
$$$$$$DESIGNER$$$$$$
$$$$$$FILENAME$$$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	65 82

B-14
71+50
30' RT

SAPROLITE, BRN SILTY SAND W/ WEATHERED RK

WEATHERED ROCK, BRN WEATHERED BIOTITE GNEISS

SAPROLITE, BRN/GRAY SAND W/ W. ROCK SEAMS

WEATHERED ROCK, GRAY WEATHERED ROCK, BIOTITE GNEISS

11
92
30
27
100+
100+
60/0.0

71+50.00

$$$$SYSTIME$$$$
$$$$DIVISION$$$$
$$$$USERNAME$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	66/82

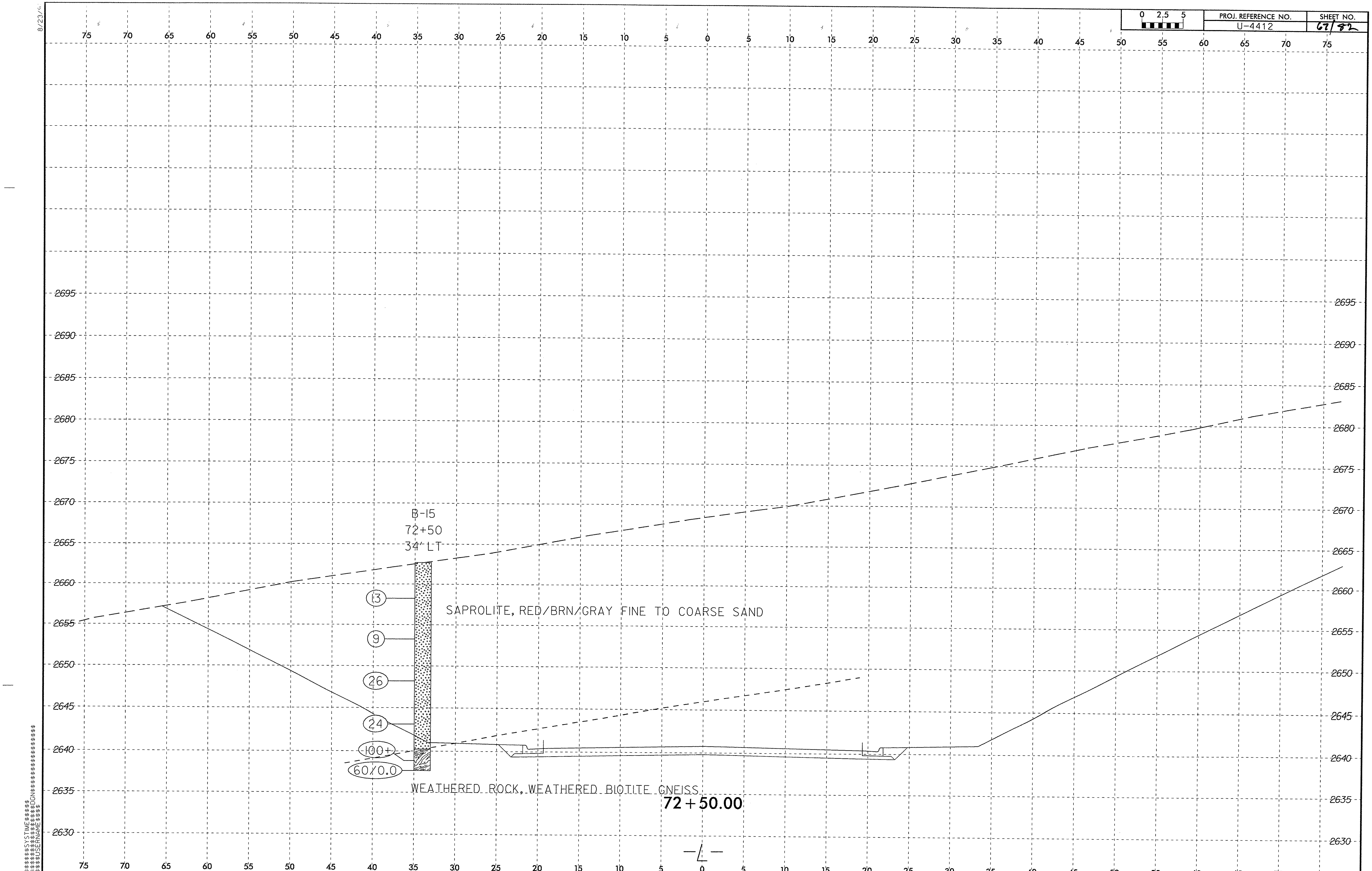
SAPROLITE, BRN. SILTY SAND W/ WEATHERED RK

SAPROLITE, BRN/GRAY SAND W/ W. ROCK SEAMS

WEATHERED ROCK, WEATHERED BIOTITE GNEISS

72+00.00

$$$$$$SYSTIME$$$$$$
$$$$$$ENAME$$$$$$DOM$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$


8/23/0
0 2.5 5
PROJ. REFERENCE NO.
U-4412
SHEET NO.
67/82
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
2695
2690
2685
2680
2675
2670
2665
2660
2655
2650
2645
2640
2635
2630
B-15
72+50
34' LT
13
9
26
24
100+
60/0.0
SAPROLITE, RED/BRN/GRAY FINE TO COARSE SAND
WEATHERED ROCK, WEATHERED BIOTITE GNEISS
72+50.00
-L-
$$$$$SYSTIME$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	68 82

B-13
73+00
50' LT

27
30
10
17
51
18
100+
100+
100+
100+
60/0.0

SAPROLITE, RED/BRN/YEL SILTY SAND

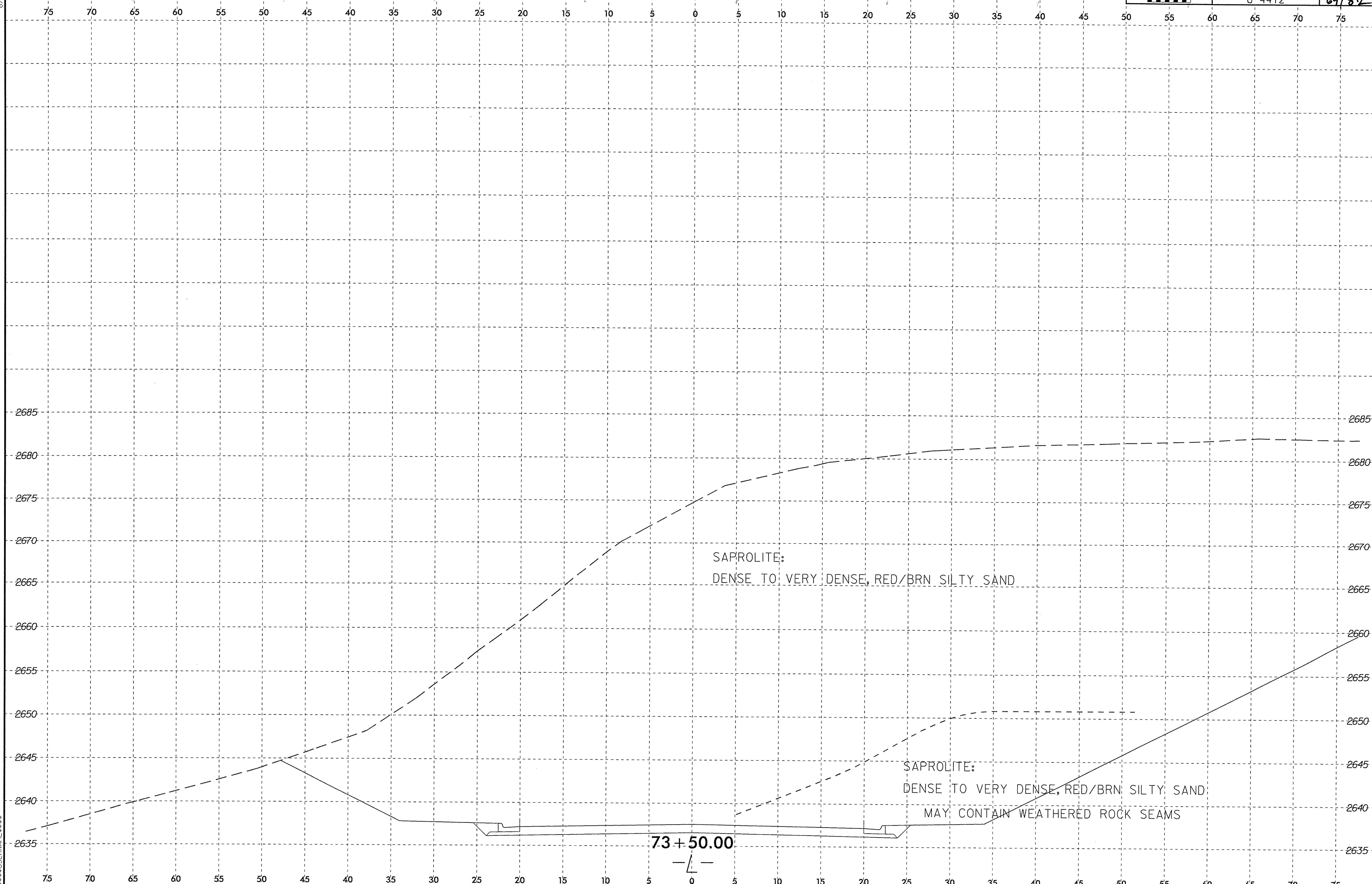
WEATHERED ROCK, WEATHERED ROCK, BIOTITE GNEISS

73+00.00

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$

PROJ. REFERENCE NO. U-4412

SHEET NO. 69/82



8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	70 of 82

B-12
74+00
℄

17
6
5
11
14
12
64
21
24
29

ALLUVIAL, RED/YEL/BRN SILTY AND COARSE SAND W/ GRAVEL

SAPROLITE, YEL/BRN SILTY SAND W/ MnO

SAPROLITE, RED/BRN SILTY SAND W/ WEATHERED ROCK SEAMS THROUGHOUT

74+00.00

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2690 2685 2680 2675 2670 2665 2660 2655 2650 2645 2640 2635 2630 2625

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$
$$$$RAWFILE$$$$
$$$$SAVED$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	71/82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2675 2670 2665 2660 2655 2650 2645 2640 2635 2630

SAPROLITE:
MED. DENSE TO DENSE, RED/BRN SILTY SAND

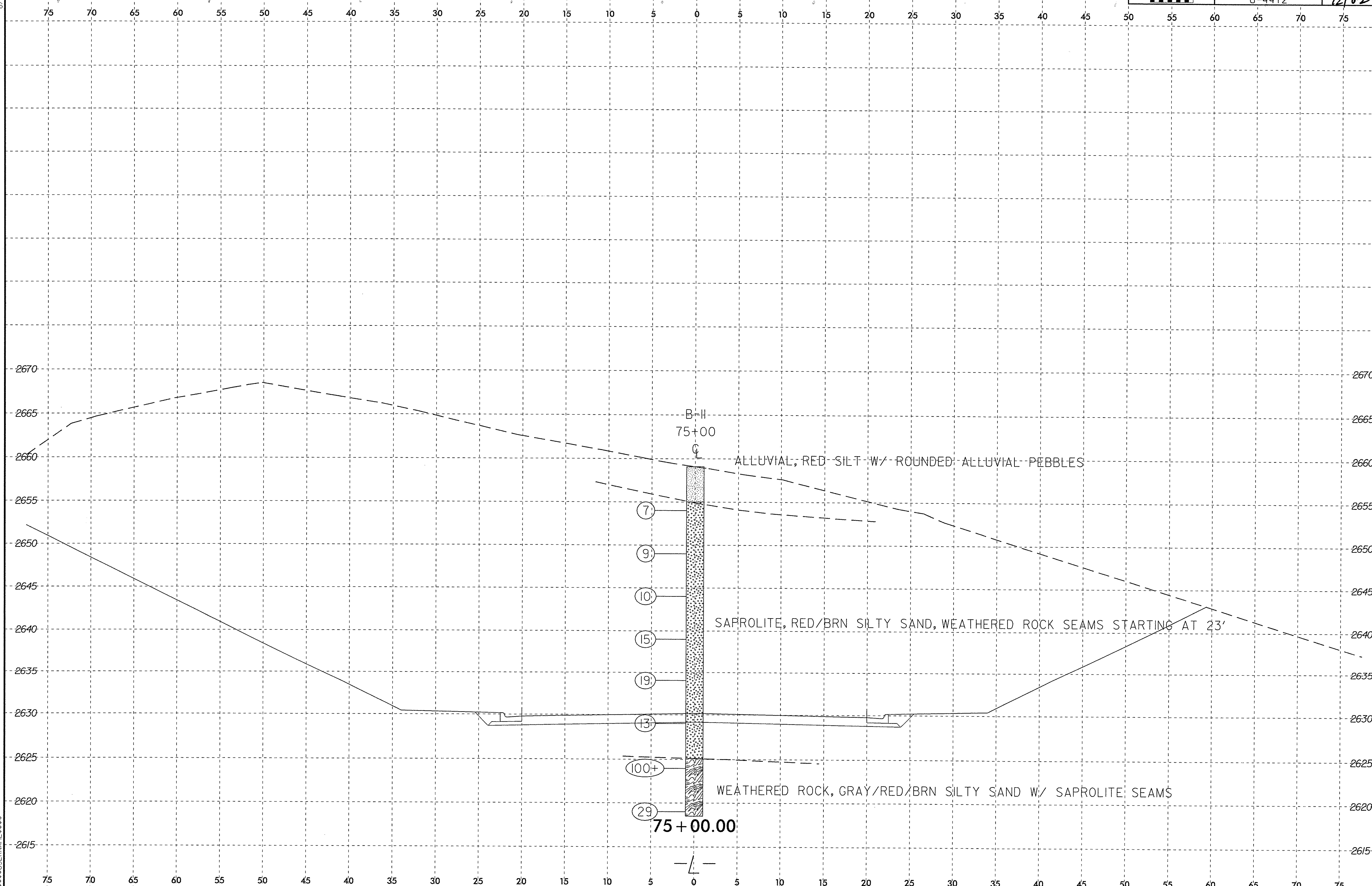
74+50.00
—L—

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

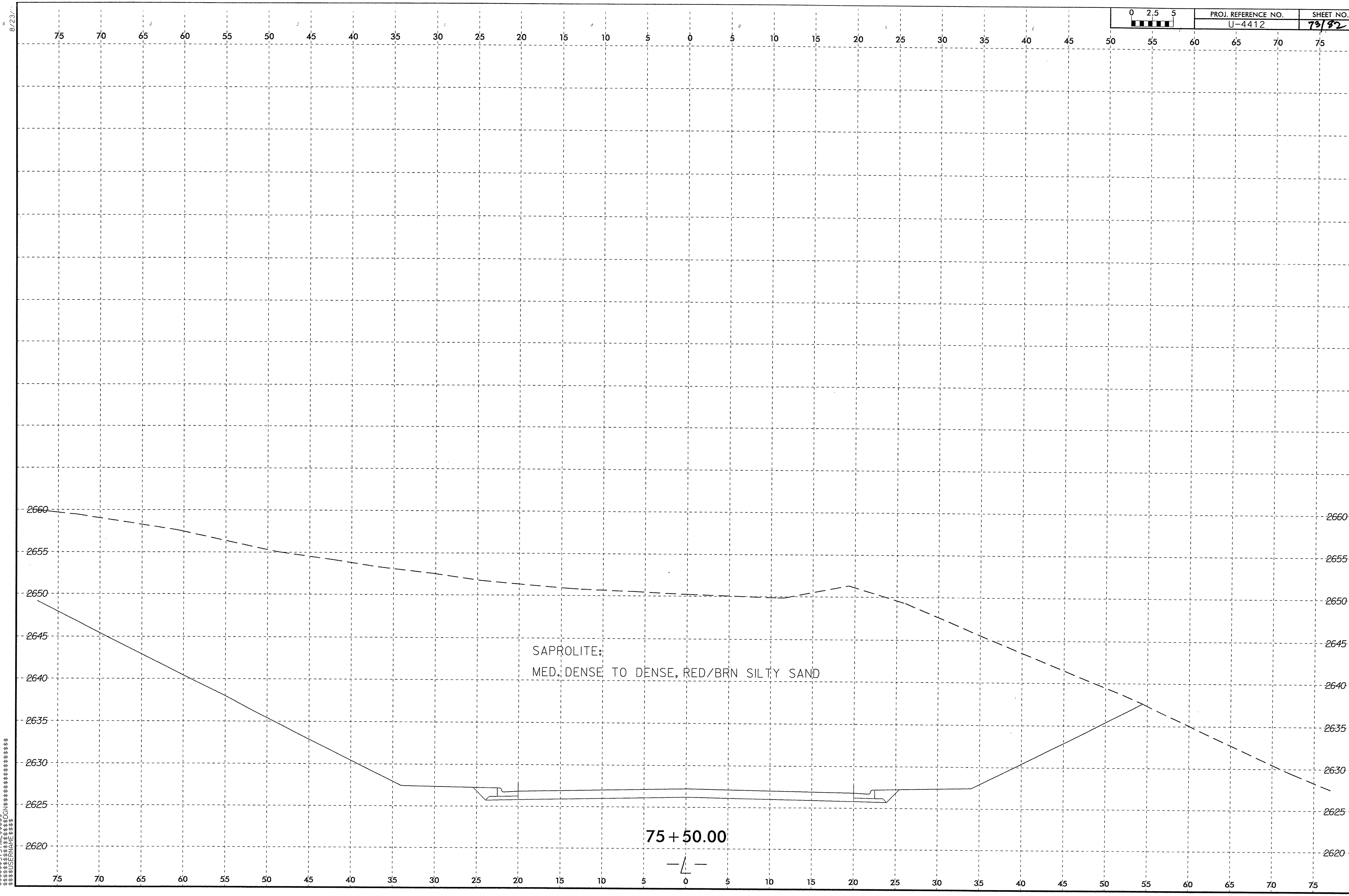
2675 2670 2665 2660 2655 2650 2645 2640 2635 2630

$$$$$$SYSTIME$$$$$$
$$$$$$DIVISION$$$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$$$

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	72/82



PROJ. REFERENCE NO.	SHEET NO.
U-4412	73/82



8/23/
$$$$$SYSTIME$$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	74/82

B-10
76+00
35' LT

RESIDUAL, RED/BRN SANDY SILT W/ GRAVEL

SAPROLITE, RED/BLK/BRN, SOME MICA, MnO, SILTY FINE SAND

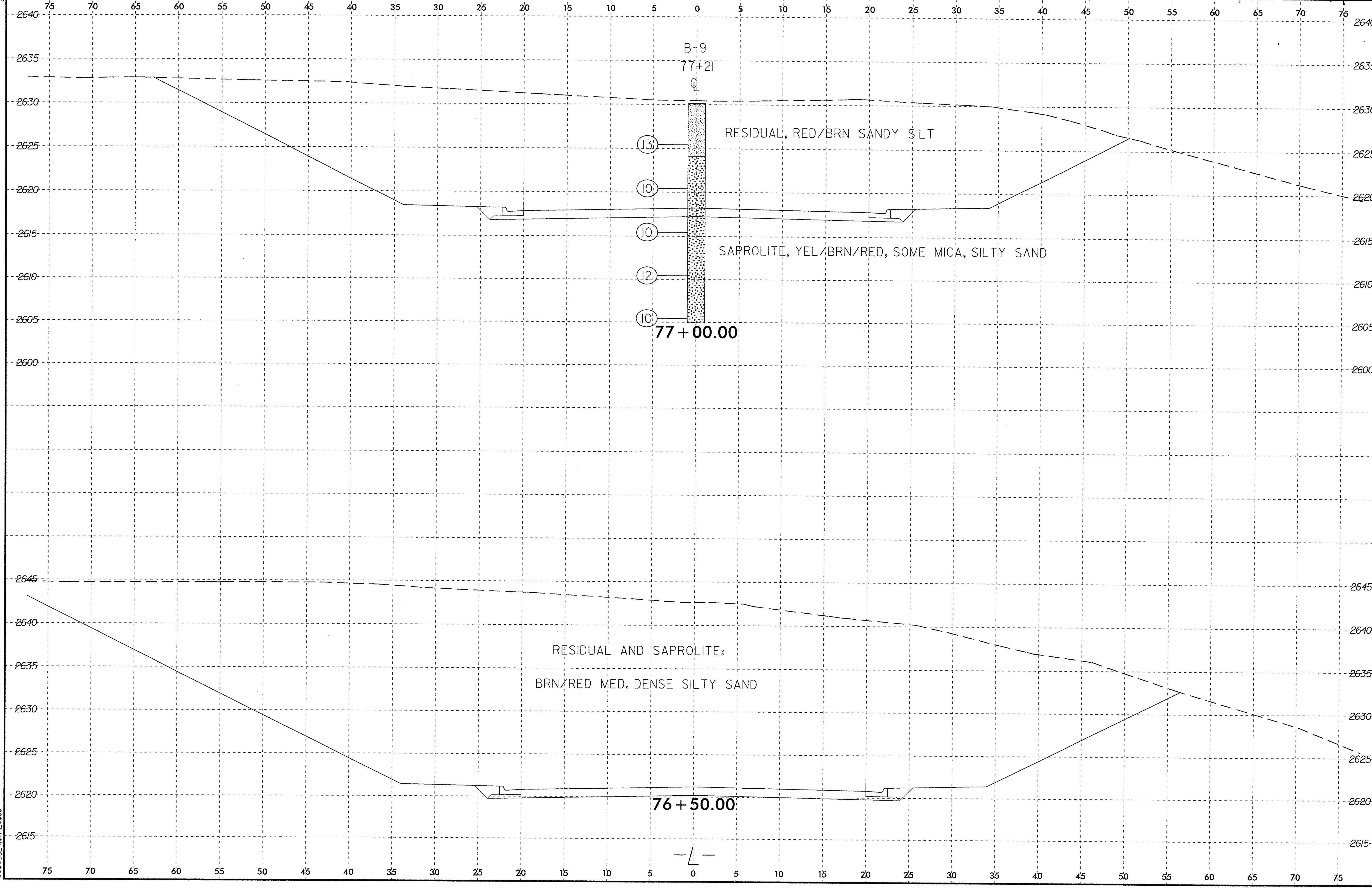
8
6
9
6
8
10
9

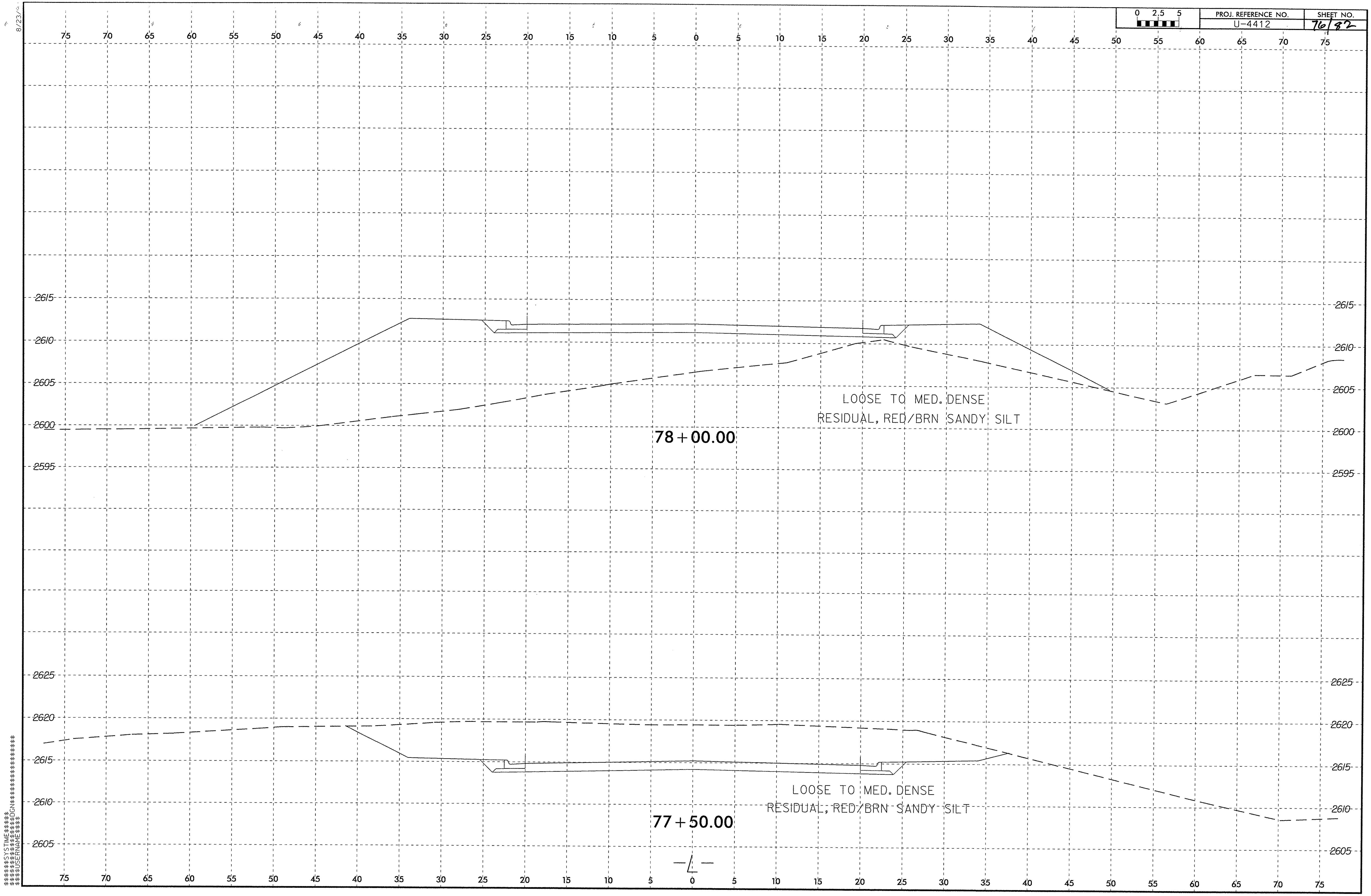
12/08

76+00.00

$$$$$$$USERNAME$$$$$$$ $$$$$$$DGN$$$$$$$ $$$$$$$TIME$$$$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-4412	78/82



 0 2.5 5
PROJ. REFERENCE NO.
U-4412
SHEET NO.
76/82
LOOSE TO MED. DENSE
RESIDUAL, RED/BRN SANDY SILT
78+00.00
2615
2610
2605
2600
2595
LOOSE TO MED. DENSE
RESIDUAL, RED/BRN SANDY SILT
77+50.00
2625
2620
2615
2610
2605
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
$$$$$SYSTIME$$$$$
$$$$$$$$$$$DGN$$$$$$$$$$$$$$$
$$$USERNAME$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	77/82

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2610
2605
2600
2595
2590
2585
2580

B-8
79+00
30' RT

5
5
8

RESIDUAL, RED/BRN SANDY SILT

79+00.00

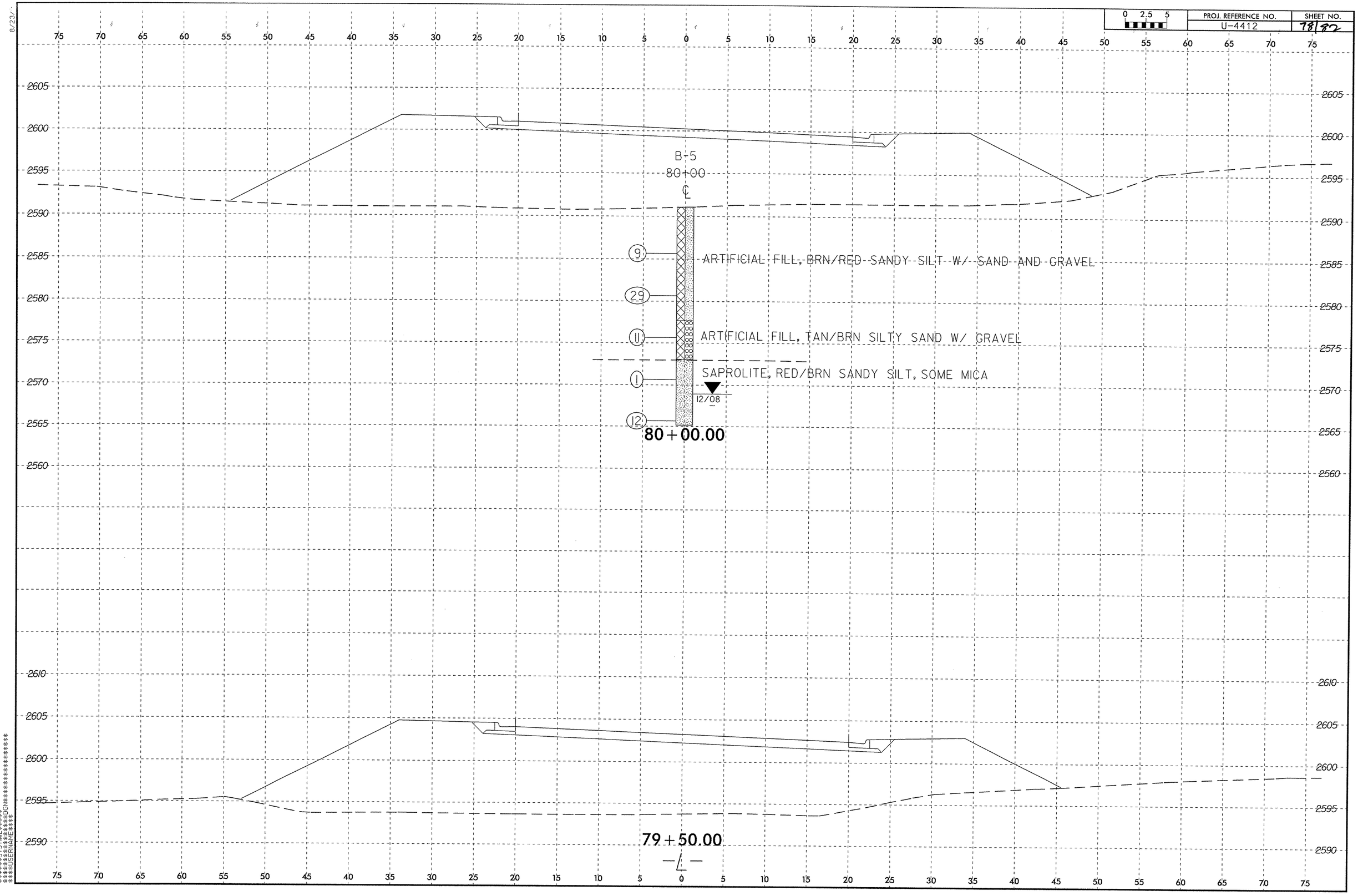
2615
2610
2605
2600
2595

78+50.00

LOOSE TO MED. DENSE
RESIDUAL, RED/BRN SANDY SILT

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$FILESIZE$$$$
$$$$DON$$$$



8/23/0

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	79/82

B-6
81+00
40' RT

(24) ARTIFICIAL FILL, RED/BRN SANDY SILT W/ GRAVEL AND BOULDERS

(17)

ALLUVIAL, TAN/BRN CLAYEY SILTY W/ COARSE SAND AND GRAVEL

(7)

(4) SAPROLITE, RED/BRN SANDY SILT AND SAND, SOME MICA

(4) 12/08

(5)

81+00.00

80+50.00

$$$$$SYSTIME$$$$$
$$$$$SCALE$$$$$
$$$$$DGN$$$$$

8/23/

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-4412	80/82

B-7
81+50
℄

10'
26'
17'
14'

ARTIFICIAL FILL, BRN SANDY SILT AND SAND W/ GRAVEL AND BOULDERS

ALLUVIAL, SANDY SILT W/ COARSE SAND AND PEBBLES

SAPROLITE, BRN/YEL SILTY SAND W/ RK FRAGS

81+50.00

$$$$SYSTIME$$$$
$$$$SCENE$$$$
$$$$SHEET$$$$

M&T 503E

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	n/a

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	U-4412 (cont.)	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	12.9.08	DATE RECEIVED:	12.9.08	DATE REPORTED:	12.22.08
SAMPLED FROM:	SS	SAMPLED BY:	J. C. Kuhne		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-6	SS-7	SS-8	SS-9				
Lab Sample No. A	159508	159509	159510	159511				
HiCAMS Sample #	--	--	--	--				
Retained #4 Sieve %	0.0	0.0	0.0	0.0				
Passing #10 Sieve %	98	94	99	99				
Passing #40 Sieve %	86	79	81	85				
Passing #200 Sieve %	54	49	27	27				

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	23	27	37	37				
Fine Sand - Ret. #270	28	24	41	40				
Silt 0.05-0.005 mm %	3	5	2	11				
Clay < 0.005 mm %	46	44	20	12				
Passing # 40 Sieve %	--	--	--	--				
Passing # 200 Sieve %	--	--	--	--				

Liquid Limit	48	45	43	34				
Plastic Index	18	14	NP	NP				
AASHTO Classification	A-7-5 (8)	A-7-5 (5)	A-2-5 (0)	A-2-4 (0)				
Quantity								
Texture								
Station	79+00	77+22	77+22	76+00				
Hole No.								
Depth (ft) From:	4.5	4.2	9.2	19.2				
To:	5.5	5.2	10.4	20.2				
	OK	OK	OK	OK				

Remarks:

A-159508 - 159511

CC:

J. C. Kuhne	
File	

SOILS ENGINEER:	

M&T 503E

81/82

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	n/a

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	U-4412	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	12.9.08	DATE RECEIVED:	12.9.08	DATE REPORTED:	12.22.08
SAMPLED FROM:	SS	SAMPLED BY:	J. C. Kuhne		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	S-1	SS-1	SS-2	SS-2	S-3	SS-3	SS-4	SS-5
Lab Sample No. A	159500	159501	159502	159503	159504	159505	159506	159507
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	11.1	0.0	0.0	3.8	0.0	0.0	0.0
Passing #10 Sieve %	68	73	71	91	72	95	98	98
Passing #40 Sieve %	54	63	57	83	56	82	90	88
Passing #200 Sieve %	30	36	34	60	31	38	67	35

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	32	26	30	20	35	27	16	28
Fine Sand - Ret. #270	28	30	25	15	24	42	16	43
Silt 0.05-0.005 mm %	12	12	15	19	11	13	12	9
Clay < 0.005 mm %	28	32	30	46	30	18	56	20
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	30	38	34	40	31	41	49	39
Plastic Index	NP	12	13	17	10	NP	24	NP
AASHTO Classification	A-2-4 (0)	A-2-6 (1)	A-2-6 (1)	A-6 (8)	A-2-4 (0)	A-5 (1)	A-7-6 (13)	A-2-4 (0)
Quantity								
Texture								
Station	82+00	82+00	80+00	80+00	75+00	80+00	81+60	81+00
Hole No.								
Depth (ft) From:	1.5	5.0	4.9	13.4	1.5	19.9	14.6	24.1
To:	4.0	6.0	5.9	14.4	3.4	20.9	15.0	25.6
	OK	OK	OK	OK	OK	OK	OK	OK

Remarks:

A-159500 - 159507

CC:

J. C. Kuhne	
File	

SOILS ENGINEER:	

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	U-4412

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	35022.1.1	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	12.18.08	DATE RECEIVED:	12.29.08	DATE REPORTED:	1.8.09
SAMPLED FROM:	Hand/SS	SAMPLED BY:	J. C. Kuhne		
SUBMITTED BY:	W. D. Frye		2002	STANDARD SPECIFICATION	
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	S-10	S-11	S-13	SS-10	SS-11	SS-20	SS-21	SS-30
Lab Sample No. A	159612	159613	159614	159615	159616	159617	159618	159619
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0
Passing #10 Sieve %	73	99	95	100	99	99	62	99
Passing #40 Sieve %	67	88	82	93	73	87	55	91
Passing #200 Sieve %	51	57	45	73	25	62	41	49

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	15	20	25	14	47	20	18	23
Fine Sand - Ret. #270	19	28	34	13	31	22	16	33
Silt 0.05-0.005 mm %	22	16	17	6	6	14	18	20
Clay < 0.005 mm %	44	36	24	67	16	44	48	24
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	37	32	33	56	44	37	38	34
Plastic Index	16	NP	NP	24	NP	18	18	NP
AASHTO Classification	A-6 (5)	A-4 (4)	A-4 (2)	A-7-5 (16)	A-2-5 (0)	A-6 (9)	A-6 (3)	A-4 (3)
Quantity								
Texture								
Station	57+00	18+00	71+50	74+00	73+00	61+00	57+00	25+00
Hole No.								
Depth (ft) From:	2.3	13.3	1.5	1	14.1	1	1	1
To:	3.6	14.3			15.1			
	OK	OK	OK	OK	OK	OK	OK	OK

Remarks:

A-159612 - 159619

CC:

J. C. Kuhne	
File	

SOILS ENGINEER:	

M&T 503E

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	U-4412

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	35022.1.1 (cont.)	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	12.18.08	DATE RECEIVED:	12.29.08	DATE REPORTED:	1.8.09
SAMPLED FROM:	SS	SAMPLED BY:	J. C. Kuhne		
SUBMITTED BY:	W. D. Frye		2002	STANDARD SPECIFICATION	
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-31	SS-32	SS-33	SS-34				
Lab Sample No. A	159620	159621	159622	159623				
HiCAMS Sample #	--	--	--	--				
Retained #4 Sieve %	7.5	0.0	0.0	0.0				
Passing #10 Sieve %	92	93	95	98				
Passing #40 Sieve %	83	84	77	90				
Passing #200 Sieve %	60	27	45	67				

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	19	27	32	14				
Fine Sand - Ret. #270	21	51	25	22				
Silt 0.05-0.005 mm %	12	10	5	20				
Clay < 0.005 mm %	48	12	38	44				
Passing # 40 Sieve %	--	--	--	--				
Passing # 200 Sieve %	--	--	--	--				

Liquid Limit	35	42	37	45				
Plastic Index	16	NP	7	19				
AASHTO Classification	A-6 (7)	A-2-5 (0)	A-4 (2)	A-7-6 (11)				
Quantity								
Texture								
Station	20+11	20+00	20+00	22+00				
Hole No.								
Depth (ft) From:	1	1	9.1	4.4				
To:			10.1	5.4				
	OK	OK	OK	OK				

Remarks:

A-159620 - 159623

CC:

J. C. Kuhne	
File	

SOILS ENGINEER:	

G:/Everyone. . . /M&T Forms/Regional Lab Statesville/Soils Test Report M&T 503E 8-19-2000